ENGINEERING NEWS-RECORD

4, 1944

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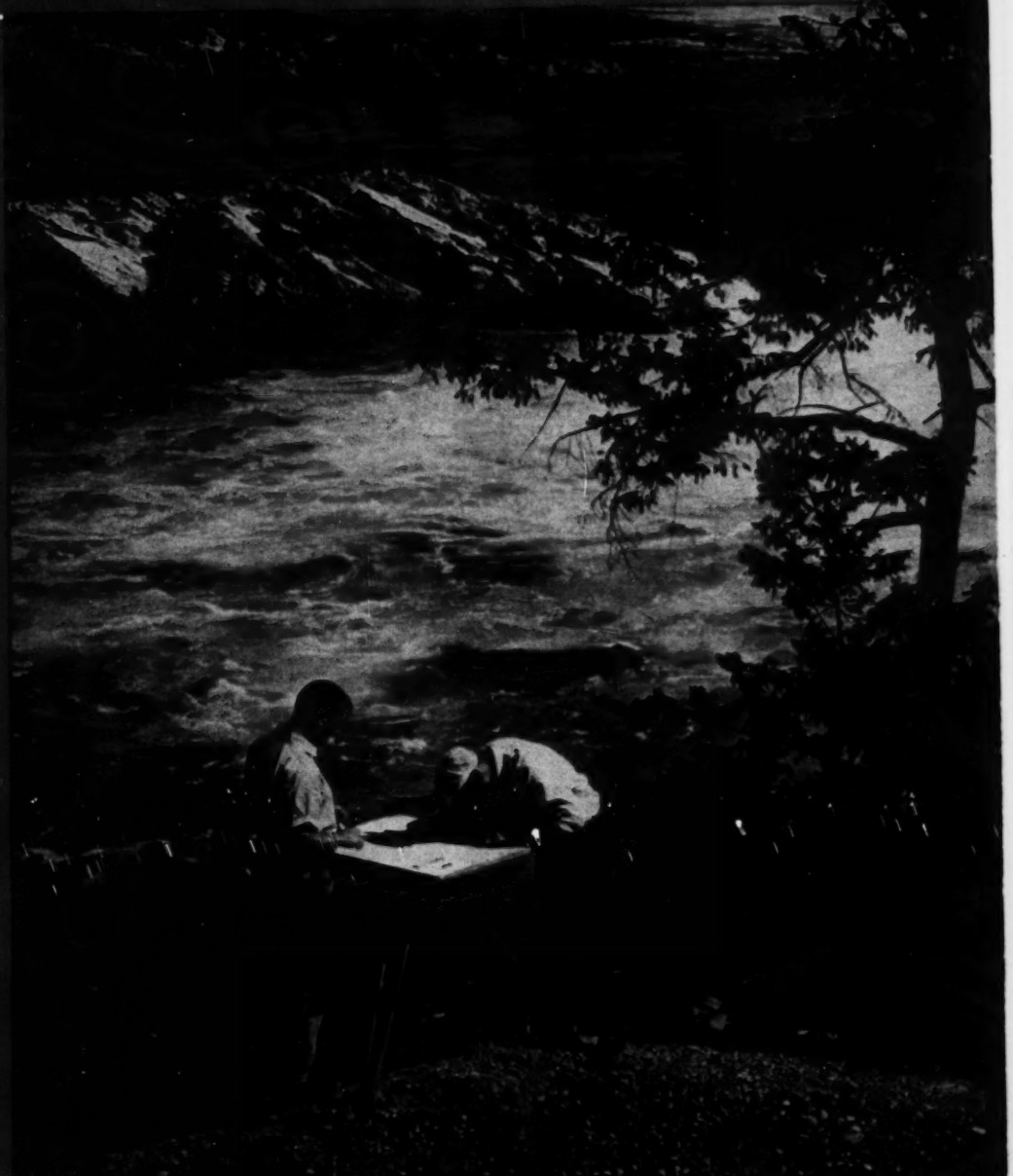
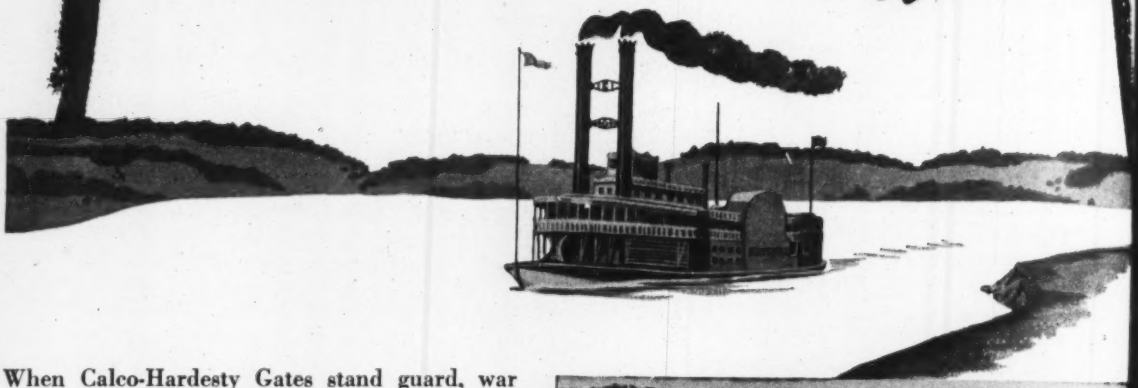


CONTROLS FOR MOVABLE BRIDGES

NOW OLD MAN RIVER

Can't "dilute" the War Effort



When Calco-Hardesty Gates stand guard, war production continues at full strength. These tried-and-proved gates eliminate the danger of high water flooding valuable property.

In war as in peace Calco-Hardesty Gates are ideal for drainage, flood control, sewer outfalls and wherever else backwater is a hazard. Unskilled labor can easily install them on any type of drainage construction. Then they are ready to say "NO" firmly when backflow threatens. Under normal conditions outflow is free and easy.

There is a size and type of gate to meet every requirement. These include automatic drainage gates that open and close without power or supervision; light- and heavy-duty slide gates; and automatic radial gates to keep water levels constant.

If you cannot get Calco-Hardesty Gates now for other than the most important war projects, remember them for the future. When the war is over they will be ready again to help protect valuable civilian property. Meanwhile write us for specific information. Armco Drainage Products Association, 315 Curtis St., Middletown, O.

ARMCO

CALCO-HARDESTY GATE

CONSTRUCTION TRENDS

Notes on significant movements in the construction industry

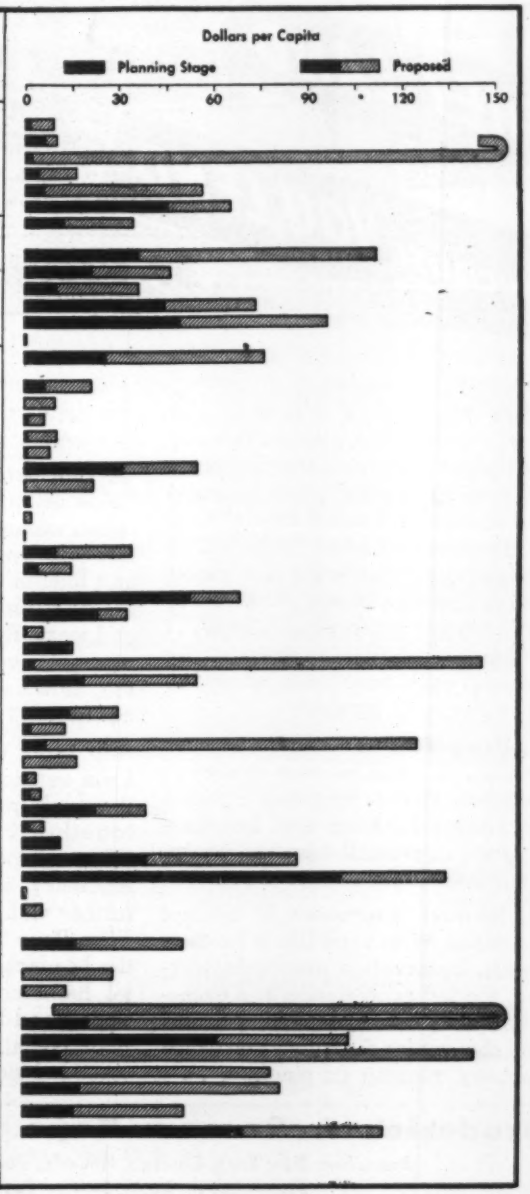
POSTWAR PLANNING PROGRESS—BY STATES

Fifteen-month 1943-'44 Volume of Proposed Projects and Plans Started as Reported to ENR

Totals are Thousands of Dollars—000 omitted

	Total Proposed Volume	Proposed Volume $ Per Capita	Total in Planning Stage	Planning Stage $ Per Capita	Planning % of Proposed
Maine	$7,642	9.0	$1,150	1.4	15.1
New Hampshire	5,058	10.3	3,130	6.4	61.9
Vermont	55,870	155.4	820	2.3	1.5
Massachusetts	72,831	16.9	18,332	4.2	25.2
Rhode Island	40,714	57.2	4,679	6.6	11.5
Connecticut	112,779	66.0	77,020	45.1	68.3
New England	**294,894**	**35.0**	**105,131**	**12.5**	**35.7**
New York	1,534,305	113.8	490,545	36.4	32.0
New Jersey	197,470	47.4	91,614	22.0	46.3
Pennsylvania	368,477	37.3	99,345	10.0	26.9
Maryland	134,610	73.9	81,867	45.0	60.8
Dist. of Columbia	63,790	96.2	32,469	49.0	51.0
Delaware	240	0.9	—	—	—
Middle Atlantic	**2,298,892**	**75.9**	**795,840**	**26.3**	**34.6**
Virginia	58,968	22.0	16,955	6.3	28.8
West Virginia	19,500	10.2	—	—	—
North Carolina	23,487	6.6	3,125	0.9	13.3
South Carolina	19,387	10.2	1,560	0.8	8.0
Georgia	25,125	8.0	2,400	0.8	9.6
Florida	103,900	54.9	61,266	32.3	59.0
Alabama	63,375	22.4	—	—	—
Mississippi	3,688	1.7	150	0.1	4.1
Louisiana	5,070	2.1	25	*	0.5
Kentucky	400	0.1	—	—	—
Tennessee	100,592	34.5	28,471	9.8	28.4
South	**423,492**	**15.0**	**113,952**	**4.0**	**26.9**
Ohio	479,296	69.4	365,280	52.8	76.2
Indiana	113,467	33.1	80,906	23.6	71.3
Illinois	51,547	6.5	5,155	0.7	10.0
Wisconsin	49,569	15.8	43,367	13.8	87.4
Michigan	772,460	146.7	16,620	3.2	2.2
Middle West	**1,466,339**	**55.1**	**511,328**	**19.2**	**34.9**
Minnesota	87,133	31.2	40,268	14.4	46.2
Iowa	32,399	12.8	5,292	2.1	16.3
Missouri	474,831	125.3	28,910	7.6	6.1
Arkansas	33,569	17.2	25	*	0.1
North Dakota	2,730	4.3	690	1.1	25.3
South Dakota	3,829	6.0	1,340	2.1	35.0
Nebraska	51,099	38.9	30,952	23.5	60.5
Kansas	12,425	6.9	3,765	2.1	30.3
Oklahoma	27,425	11.8	26,975	11.6	98.3
Texas	566,942	88.4	251,194	39.2	44.3
Montana	75,773	135.5	57,150	102.3	75.5
Wyoming	245	1.0	—	—	—
Colorado	6,884	6.1	550	0.5	8.0
New Mexico	—	—	—	—	—
West of Mississippi	**1,375,284**	**51.6**	**447,111**	**16.8**	**32.6**
Idaho	15,000	28.6	—	—	—
Utah	7,373	13.4	322	0.6	4.4
Arizona	—	—	—	—	—
Nevada	31,920	290.2	2,350	21.4	7.4
Washington	180,316	103.9	107,228	61.9	59.5
Oregon	157,231	144.2	13,486	12.4	8.6
California	548,195	79.3	88,329	12.8	16.1
Far West	**940,035**	**82.3**	**211,715**	**18.5**	**22.5**
U.S. Total	**6,798,936**	**51.7**	**2,185,077**	**16.6**	**32.2**
Canada	**1,310,526**	**115.0**	**807,930**	**70.8**	**61.6**

*Less than 5c per capita.



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Our troops go ashore from a landing barge to engage the
Wire Rope
Made in U.S.A.
THEY LAND
Because YOU LEND
...BY SAVING WIRE ROPE

Wire Rope goes wherever our land, sea and air forces go. To carry the fight to the enemy, their supply of rope must constantly be renewed and expanded. You tell them, "Here ... use some of mine," every time you get along with fewer new ropes. The suggestions below, *if followed,* will help you conserve wire rope ... and time ... and manpower ... by making each rope installation deliver maximum service:

1. Use preformed rope wherever possible. It handles more easily ... requires a shorter breaking-in period ... resists kinking and bending fatigue ... protects men and equipment from broken outer wires.

2. Instruct operators in correct practices. Wire rope life is in their hands. By avoiding overloads, jerking, too fast acceleration and excessive speeds ... by watching drums and sheaves for conditions that cause rubbing, nicking or pinching ... the operator may double the service of a rope.

3. Lubricate wire rope faithfully. Think of those endless grooves between wires and strands as oil holes through which the moving wires and hidden core must get sufficient lubrication to minimize friction and wear. Rust and corrosion attack rope parts whether working or waiting, unless you provide a protective coating.

And team up ropes that give uniform service. *Preformed* Yellow Strand Wire Ropes work smoothly together because they are engineered to the same standards of efficiency and durability. Teamed further with Yellow Strand Braided Wire Rope Slings, they take a lot of the headache out of wartime material handling. Our Industrial Wire Rope Hand Book and Riggers' Hand Book contain many practical pointers. Send for either or both ... today.

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JOHN ABBINK, *Publisher*

WALDO G. BOWMAN, *Editor* ALBERT E. PAXTON, *Manager*

32 May 4, 1944 No. 18

MING NEXT

$130,000,000 controversial Oil supply project in Alaska- has now been completed de- uch criticism directed against y. The project includes the ment of an oil field in the es of Northwest Territory, g a refinery transplanted from installing pumping stations ying some 1,600 miles of steel as well as much pioneer road to bring in supplies. H. W. dson, western editor, of *ENR* several weeks on the project it was under construction, and port will be a feature of the 8 issue.

abled financial waters are ahead for general contractors bcontractors alike unless they e necessary steps now to safe- their credits, and unless they eir aid in helping to stabilize nstruction industry. James J. general agent, Maryland y Co., explores the future s of the industry and points ay toward stabilization in a nstructive article to appear in ay 18 issue.

owing up the news report of ord-breaking Mississippi River n this issue, the May 18 issue arry a detail account of the struggles of the Army Engi- and the 10,000 troops under o save important levees in the of the flood. V. T. Boughton, ate editor of *ENR*, prepared port from first hand informa- btained on the scene of action.

OKING AHEAD

ILDING WITH SKYHOOKS", one most interesting stories yet to out of the great North Country, f the struggles against almost ountable odds in building a of coast defense stations along gged peaks of Alaskan moun- H. W. Richardson, *ENR* west- itor, who recently spent several inspecting this work, has pre- a story that will intrigue every looded construction man. It ppear in an early issue.

ing June 1, a special section d to the latest developments water works field.

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Number of copies of this issue printed: 36,422

CHANGE OF ADDRESS

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with Greater Bonding Power
Available from Ryerson Stocks
The new Hi-Bond reinforcing bars offer a combination of great strength and tremendous bond anchorage for all types of reinforced concrete construction. They herald new opportunities for material savings and lighter, stronger construction. Hi-Bond bars are immediately available from Ryerson stocks in a complete range of sizes, in all standard lengths. Bars are cut or bent to your exact specifications—each shipment is tagged for quick placement. Inland Hi-Bond bars cost no more. Ryerson engineers will gladly work with you in applying this new bar to your job. Call, wire or write your nearby Ryerson plant for an estimate on all your reinforcing steel requirements. Send for the Hi-Bond bulletin and your copy of the Ryerson Stock List.
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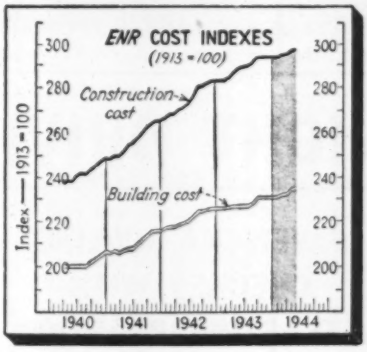
NTHLY CONSTRUCTION BUSINESS SUMMARY

ONSTRUCTION VOLUME AND NEW PRODUCTIVE CAPITAL (000 omitted)

	April			Four Months		
	1943 (5 wk.)	1944 (4 wk.)	% Change†	1943 (17 wk.)	1944 (17 wk.)	% Change
Construction	$379,068	$145,040	−52.0	$1,218,109	$595,162	−51.0
nstruction	45,710	27,649	−24.0	127,752	125,989	−1.0
struction	333,358	117,391	−56.0	1,090,357	469,173	−57.0
nstruction	306,753	97,753	−60.0	1,034,601	415,900	−60.0
Productive Capital	$416,561	$183,997	−45.0	$479,279	$365,635	−24.0
estment	9,166	22,757	+210.0	67,296	106,023	+58.0
on-federal work)	7,045	46,240	+721.0	11,633	53,780	+362.0
deral work)	400,350	115,000	−64.0	400,350	205,832	−49.0
struction Volume In- = 100	225	106	−53.0	214*	102*	−52.0

† *Adjusted for difference in number of weeks reported.* * *Four-month average.*



STRUCTION COSTS . . . . WAGE RATES . . . . MATERIAL PRICES

	May			Change April to May 1943			Change April to May 1944		
	1943	1944	% Change	Apr.	May	%	Apr.	May	%
nstruction Cost 913 = 100‡	289.87	298.00	+2.8	288.80	289.87	+0.4	297.70	298.00	+0.1
lding Cost Index, 100‡	227.64	234.80	+3.1	227.50	227.64	+0.1	234.50	234.80	+0.1

‡ *does not reflect increased costs due to more overtime, lower labor efficiency, delivery delays, etc.*

ENR 20-CITIES' AVERAGE

abor	$0.863	$0.874	+1.3	$0.858	$0.863	+0.6	$0.874	$0.874	0
or (Av. 3 trades)	1.614	1.632	+1.1	1.613	1.614	+0.1	1.632	1.632	0
	1.703	1.726	+1.4	1.703	1.703	0	1.726	1.726	0
ironworkers	1.671	1.688	+1.0	1.671	1.671	0	1.688	1.688	0
	1.468	1.481	+0.9	1.465	1.468	+0.2	1.481	1.481	0
bbl	$2.61	$2.64	+1.1	$2.61	$2.61	0	$2.62	$2.64	+0.8
steel, cwt	2.74	2.79	+1.8	2.74	2.74	0	2.79	2.79	0
steel, base	2.10	2.10	0	2.10	2.10	0	2.10	2.10	0
	1.21	1.23	+1.7	1.21	1.21	0	1.23	1.23	0
4 Fir, per M ft.	50.88	54.07	+6.3	51.05	50.88	−0.3	53.99	54.07	+0.1
4 Pine, per M ft.	44.97	52.68	+17.2	44.66	44.97	+0.7	52.20	52.68	+0.9
non, per M	15.68	16.45	+4.9	15.63	15.68	+0.3	16.20	16.45	+1.5
d concrete, c.y.	7.37	7.39	+0.3	7.37	7.37	0	7.39	7.39	0
tile, 3x12x12-in.	78.97	79.64	+0.8	78.93	78.97	+0.1	79.34	79.64	+0.4
alt, cars, ton	15.32	15.25	−0.5	15.21	15.32	+0.7	15.25	15.25	0

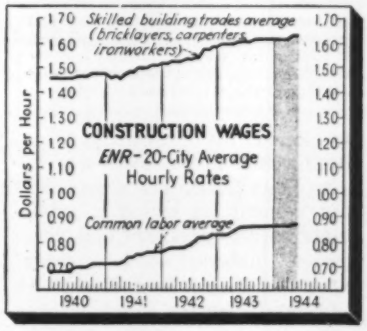
ENR INDEX NUMBERS

Base = 100	Construction Cost 1913	Construction Cost 1926	Building Cost 1913	Building Cost 1926	Volume '13	Volume '26
May, 1944	298.00	143.25	234.80	126.93	...	...
April, 1944	297.70	143.10	234.50	126.76	106	46
Mar., 1944	295.34	141.97	232.32	125.59	103	45
Feb., 1944	295.05	141.83	232.03	125.43	86	38
Jan., 1944	294.57	141.60	231.55	125.17	114	50
Dec., 1943	294.51	141.57	231.49	125.14	103	45
Nov., 1943	294.41	141.52	231.39	125.08	149	65
Oct., 1943	294.31	141.47	231.29	125.03	142	62
Sept., 1943	294.09	141.37	231.20	124.98	155	68
Aug., 1943	291.38	140.07	228.49	123.51	119	52
July, 1943	289.92	139.36	227.89	123.19	175	77
June, 1943	289.94	139.37	227.71	123.09	204	89
May, 1943	289.87	139.34	227.64	123.06	203	89
April, 1943	288.80	138.83	227.50	122.98	225	99
1943 (Av.)	289.95	139.38	228.75	123.66	176	77
1942 (Av.)	276.31	132.82	222.39	120.22	553	243
1941 (Av.)	257.84	123.95	211.46	114.32	375	164
1940 (Av.)	241.96	116.31	202.81	109.64	269	118

MATERIAL SHIPMENTS . . . . BUILDING PERMITS

	April		%	Mar.	% Change
	1943	1944	Change	1944	Mar.-Apr.
perating capacity) A. I. S. I.	99.4	99.4	0	99.1	+0.3

	March		%	Three Months		%
	1943	1944	Change	1943	1944	Change
structural steel, tons, A. I. S. C.	93,968	34,208	−63.6	276,706	101,826	−63.2
ous. bbl., U. S. B. of M.	10,107	6,225	−38.5	27,404	16,326	−40.4
rmits, 215 cities, Dun & Brad- 00 omitted)	$34,785	$75,827	+118.0	$92,241	$150,010	+62.6



COST OF LIVING INDEX . . . . EMPLOYMENT

	March		%	Feb.	% Change
	1943	1944	Change	1944	Feb.-Mar.
ving Index, N. I. C. B.	103.0	103.4	+0.4	103.4	0
sing) Index, N. I. C. B.	90.8	90.8	0	90.8	0
loyment (est.) thous., B. L. S.	38,115	36,946	−3.1	37,123	−0.5
nployment (est.) thous., B. L. S.	1,357	617	−54.5	641	−3.7

ENGINEERING CONSTRUCTION CONTRACTS—ENGINEERING NEWS-RECORD—APRIL, 1944

g News-Record *reports continental U. S. Construction projects of the following minimum cost—waterworks, excavation, drainage and irrigation,* $15,000; *other public works,* $25,000; *industrial buildings,* $40,000; *other buildings,* $150,000

Four Weeks—Thousands of Dollars (000 Omitted)

	New England	Middle Atlantic	South	Mid West	West of Mississippi	Far West	United States April 1944	United States Four Months 1944	United States Four Months 1943	Canada
rks										
works	50	135	600	94	493	279	1,651	8,054	18,468	.....
ge	25	.....	873	77	489	367	1,831	7,860	13,365	25
, public	.....	.....	260	557	65	487	1,369	2,729	7,353	25
work and waterways	.....	127	509	15	673	4,025	5,349	19,995	11,445	.....
and roads	162	1,856	5,726	4,080	4,586	2,261	18,671	44,985	64,637	223
gs, public	2,505	10,762	9,609	18,306	4,525	18,798	64,505	252,784	633,276	391
fied, public	883	4,430	6,718	673	1,258	10,053	24,015	132,766	341,813	341
	3,625	**17,310**	**24,295**	**23,802**	**12,089**	**36,270**	**117,391**	**469,173**	**1,090,357**	**1,005**
l government (included ove classifications)	3,412	16,240	18,117	19,032	6,970	33,982	**97,753**	**415,900**	1,034,601	.....
, private	.....	.....	.....	.....	.....	.....	.....	870	1,550	.....
rial buildings	677	591	2,121	415	1,916	1,130	6,850	46,829	44,674	4,690
rcial buildings	319	3,702	500	600	3,376	9,194	17,691	67,164	69,835	950
fied, private	35	86	515	140	1,689	643	3,108	11,126	11,693	75
	1,031	**4,379**	**3,136**	**1,155**	**6,981**	**10,967**	**27,649**	**125,989**	**127,752**	**5,715**
ecting Construction:										
4 weeks	**4,656**	**21,689**	**27,431**	**24,957**	**19,070**	**47,237**	**145,040**	.....	.....	**6,720**
4–5 weeks	3,371	16,309	38,854	22,342	25,256	69,594	**175,726**	.....	.....	12,592
4 weeks	16,835	64,253	94,645	54,736	69,746	78,853	**379,068**	.....	.....	8,533
e 1944	**17,052**	**88,508**	**99,325**	**74,048**	**91,538**	**224,690**	.....	**595,162**	.....	**23,862**
e—1943	53,515	165,888	277,960	139,956	277,046	303,744	.....	.....	1,218,109	31,617

CONCRETE HIGHWAY NEWS

Universal Atlas Cement Company (United States Steel Corporation Subsidiary)
Chrysler Building, New York 17, N. Y.

OFFICES: New York, Chicago, Albany, Boston, Philadelphia, Pittsburgh, Minneapolis, Duluth, Cleveland, St. Louis, Kansas City, Des Moines, Birmingham

NIGHT DRIVING CAN BE MADE SAFE ON POST-WAR ROADS

with Atlas White Concrete Reflecting Curb

Installations already made in a dozen states show safety fa of this new type curb. Results suggest its expanded use tomorrow's new or modernized highways

Photographs showing smooth curb (foreground) and White Concrete Reflecting Cu under identical conditions. On a dry night (left) the marked increase in visibility of th White Reflecting Curb is clearly shown. On a wet night (right, taken during a hea rain) the smooth curb is practically invisible, but the White Reflecting Curb shines o as a White Guide to Safety.

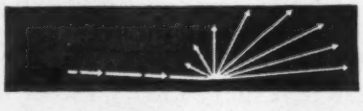
This new type curb utilizes the basic principles of light reflection to promote greater safety on highways.

For greatest visibility the curb must reflect the car's own lights. To do this effectively the curb must first be white. Second, and equally important, it must reflect this light *in the right direction*, so that the curb is visible. Ordinary smooth curb reflects light away from the driver, and the curb is barely visible. But the saw-tooth faces of White Reflecting Curb made with Atlas White cement catch headlight rays and reflect them back, right to the driver's eyes, curb stands out bright and clear diagrams below show the differ

When rain at night makes way and curb a watery mirror difference is even greater. Ordi smooth curb is almost invisible White Concrete Reflecting stands out more brightly than —at the time it is needed most. or night, it's a white guide to s

For information on design an stallation, write to our Atlas Bureau. Ask for a copy of the "A White Guide to Safety."

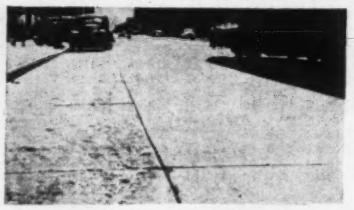
A smooth curb (left) wastes light . . . reflects it up and away from the driver. A White Con crete Reflecting Curb (right) conserves light . . . reflects it back to the driver. A smooth cur is barely visible at night; a White Concrete Reflecting Curb stands out—bright and cle



PAVEMENT SCALING CHECKED WITH ATLAS DURAPLASTIC*

air-entraining cement

More than 60 installations in a dozen states prove results of Universal Atlas research



Minneapolis street photographed after four winters of salt de-icing treatment. Left lane, laid with normal portland cement, is badly scaled. Right lane, laid at the same time with Atlas Duraplastic, is practically scale-free.

Developed by Universal Atlas after 6 years of tests and research, Atlas Duraplastic is a true portland cement in which a small amount of air-entraining material, precisely determined for proper performance, is interground during manufacture.

Five years' experience shows that it makes concrete paving highly resistant to scaling due to action of de-icing salts, and protects it against the effects of freezing and thawing weather. It makes concrete more workable, minimizes segregation and bleeding, increases durability, permits earlier finishing. No additional materials are needed at the mixer.

For reports on city and state test highways and on the original research, write to our Technical Service Bureau.

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ENR-CD-2

UNIVERSAL ATLAS CEMENTS

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The Week In Engineering and Construction

NEERING NEWS-RECORD • MAY 4, 1944 • VOLUME 132 • NUMBER 18

ississippi River flood eaks 100-year record

st at St. Louis goes slightly over last year's level, ch has not been exceeded since 1844—floods falling he Missouri and Illinois Rivers.

V. T. Boughton
Associate Editor, Engineering News-Record

waters coming down the upper pi, the Missouri and the Illi- rs at near record heights have d to produce a flood level that l 30 reached 39.2 ft. at St. s exceeding the record set last a few inches and surpassing all ods since 1844, when a crest ft. was recorded. As a result, valley above St. Louis where e rivers converge is a vast ex- f water, in which part of the the Missouri is sweeping across nds, roads and railroad tracks the Mississippi, several miles ormal mouth of the Missouri. m. May 2 the crest at St. Louis len to 38.4 ft. At Chester, 70 own stream, it was at 37.3 with predicted.

Road and rail lines out

ways and rail lines in the river of the lower Missouri valley Mississippi valley as far south e Girardeau are out of service, low-lying parts of valley cities tected by seawalls or levees are water.

the main St. Louis waterfront, he bluffs on the St. Louis side high levees protecting East St. estrict the channel, this writer water reach up almost to the line of the arches of the famous ridge. At this place only the l Railroad's elevated line is ater.

ntrast to last year when 625,000 protected and unprotected land ndated in the St. Louis Engi- istrict, and when most of the rotected by levees were flooded overtopping or failure of levees, at majority of the levees were still holding by Sunday, when the crest reached St. Louis. Such failures as had occurred were chiefly in the smaller levee districts where levees are not up to Army Engineer standards.

No major levee protecting the fertile Illinois river bottoms in the 80 miles between Beardstown and the mouth had failed by Sunday afternoon, when the river appeared to be at its crest, but a levee at Meredosia, Ill., was in grave danger. Several large levee districts in that area were flooded last year when the crest was about 1½ ft. higher.

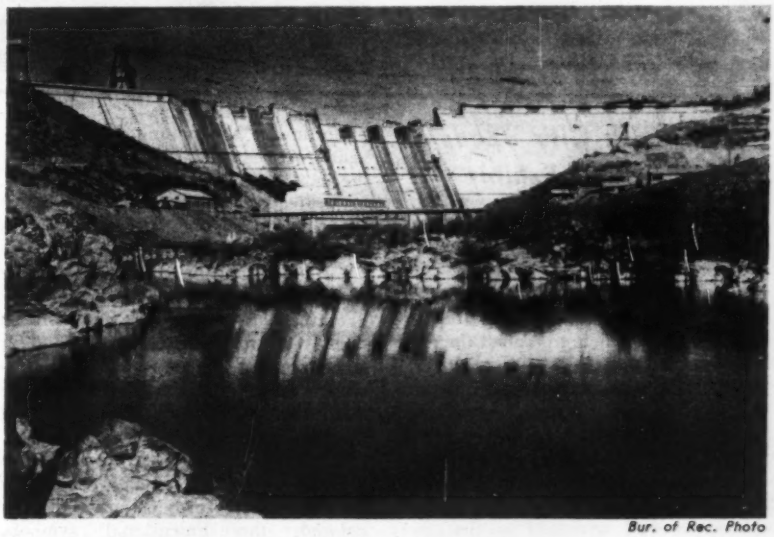
At Chain of Rocks Bridge a desperate fight of the Army Engineers to save the Chouteau Island levee was lost on Sunday. Farther downstream a similar fight was lost at Harrisonville.

A flank levee near the mouth of the Big Muddy river between Chester and Cape Girardeau failed Tuesday—a serious loss as ultimately 53,400 acres in five levee districts will be flooded.

A more detailed report of the splendid fight being made by the Army Engineers and the 10,000 troops under them to save these levees is to be given in a later issue. Work along the Illinois and Mississippi Rivers in the St. Louis District is under Col. Malcolm Elliott and Col. L. B. Feagin, and a staff of field men at strategic points.

On Tuesday troops and residents were still working to save the town of Dupo, Ill. The water breached the dike in several points. However the river was falling and most of the danger seemed past.

Serious floods in the Mississippi below the mouth of the Ohio at Cairo are not expected, as the Ohio is not in flood.



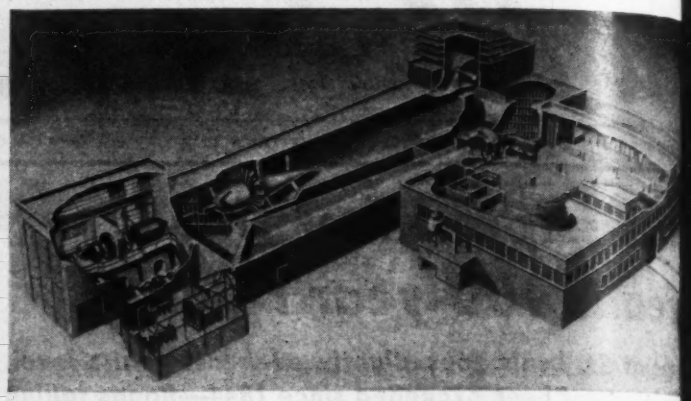
Bur. of Rec. Photo

Shasta Dam in California nears completion

Water storage in California's tremendous Shasta Dam reached the 1,000,000-ac.ft. mark in the 4,500,000-ac.ft. capacity reservoir in mid-April, it has been announced by the Bureau of Reclamation.

At the face of the structure water was 325 ft. deep and was backed up behind the dam for about 30 miles, covering deep canyons and completely submerging the town of Kennett, Shasta County.

High velocity wind tunnel built of concrete



Airplane research was given another boost on April 22 when the Boeing Aircraft Co. dedicated a new wind tunnel and testing laboratory at its Seattle plant. Built by The Austin Co., the tunnel is of reinforced concrete and notable for the close tolerance, 1/16-in., to which the test section surface, shown at the right, had to be finished. The tunnel, as shown in the cutaway view above, forms a 450-ft. long closed circuit, doubling back on itself. It varies in size from 8 x 12 ft. at the throat or test section up to 27½ ft. square at the intake, where a 24-ft. dia. fan is located (see view above). Capable of taking model airplanes up to 11 ft. wing spread or full-scale airplane sections of that size, and testing them at speeds up to 700 mph., the tunnel required intricate construction, to be described in an early article.

New York City opens its "Postwar Exhibit"

New York City has opened a "Postwar Exhibit" at 500 Park Avenue, Manhattan. It is designed to give the public a preview of the city's billion dollar program of essential public improvements now being planned for postwar construction.

The exhibit shows in dramatic form what is being planned, where the projects will be located and the purposes they will serve. Each model represents an actual project for which plans and specifications are now completed or well advanced so that construction contracts may be let as soon as the war is over. All city departments and agencies have cooperated in the program prepared by the City Planning Commission at the direction of Mayor F. H. La Guardia.

The two underlying principles of this program are the planning now of urgently needed public improvements and the immediate preparation of a backlog of projects which can be put under contract immediately after the war to help relieve possible unemployment. It is estimated that this construction at the peak will provide direct employment for about 250,000 men. Many more will be employed producing materials, and in transportation and other related industries. Graphic displays indicate the quantities of materials to be used and the man-hours of labor involved.

The central feature of the exhibit is a large floor model of New York City on which all the projects are shown by colored, three-dimensional symbols. From a semi-circular ramp visitors can look down on this map.

The exhibit is open Mondays, Wednesdays and Fridays from 1:00 to 9:00 P. M., and Tuesdays, Thursdays, Saturdays and Sundays from noon to 6:00 P. M.

Private water service expensive for Pittsbu

Pittsburgh municipal officials considering whether to start conde tion proceedings against the S Pittsburgh Water Co.—a private u —so the city itself through its munic owned system might furnish service thus eliminate payments that last amounted to $157,000.

The situation results from the that the South Pittsburgh Water bills the city for water service to 21,000 consumers—95 percent of w are property owners on the south of the city. The city then bills same customers at the lower muni water department rate.

Last year the South Pittsburgh W Co. charged $450,699. Since the billed the customers for only $29 it had to pay the difference to the company from municipal treasury f

resident's and MacDonald's views iven to House Roads Committee

postwar rural roads they favor apportioning federal funds on basis of one-third each for population, area and mileage, and population basis for urban areas. Committee to draft new bill

House Roads Committee has leted hearings on the proposed ar highway program, and expects e a bill of its own to present to ess this week.

sident Roosevelt's views presented committee, were on the method portioning federal funds for state He recommended the present of distribution one-third popula- ne-third area, and one-third post- mileage—for highway outside areas, while for highways inside areas he recommended appor- nt on the basis of population. ews were presented in a letter to Gen. Philip B. Fleming, adminis- of the Federal Works Agency. Fleming said he advocated a 50- aring of state and federal funds, t a larger proportion of federal might be necessary immediately the war (to get the program off early start). He said that if H.B. which provides $1,000,000,000 a for three years for postwar high- construction, came through the ittee as it is, he would be satisfied.

mas H. MacDonald, commis- of public roads, as to apportion- recommended that the commit- dopt a modification of H.R. 2426 the executive committee of the rican Association of State Highway ials had said would be satisfactory if the House Committee can not on the bill as written. This modi- on would provide $450,000,000 of proposed $1,000,000,000 a year for federal aid system apportioned on basis of one-third population, one- area, and one-third postroad mile- $25,000,000 for secondary and r roads outside large cities or in- municipalities of less than 10,000 lation, apportioned on the same ; and $300,000,000 for principal ways in urban areas, either on or off federal aid system, apportioned ac- ing to population, in cities of 10,000 ore.

comparison, H.R. 2426 would pro- $500,000,000 for the federal aid m, $291,000,000 for secondary and r roads, and $209,000,000 for urban ways and would be apportioned on sis of one-half population, and one- h each area and postroad mileage. oncerning the matching of federal funds with state money, Mr. MacDonald strongly upheld the present 50-50 ratio as a permanent working basis, but advocated a temporary departure as to get work under way promptly after the war. Though some states will have accumulated funds due to lack of wartime construction, he said, many will be short because of the wartime drop in motor vehicle registration fees and gasoline taxes. Because the states will be faced also with a large, accumulated maintenance program, he said, he advocates a sliding scale of federal participation, 75 federal-25 state the first year after the war, 60-40 the second, and a return to the standard 50-50 matching basis thereafter. H.R. 2426 provides for a 75-25 ratio for all three years.

In support of the sliding scale, Mr. MacDonald said that estimates of state highway receipts and expenditures indicate that whereas only 17 states would have to acquire additional funds to take up federal allotments on a 75-25 basis the first year, 39 states would face this necessity if funds were matched 50-50.

Social benefit of good roads

In proposing $91,000,000 a year more for urban highway construction than is provided by H.R. 2426, Mr. MacDonald said that express highways into or around cities not only provide needed traffic lanes, but also serve to replace slums, thus reducing crime and delinquency, and helping business.

Some New England states had earlier testified that their secondary roads were up to standard, and so they asked for flexibility in use of funds. Mr. MacDonald, however, said he could not agree that secondary roads in all the states are wholly adequate, since bridges are often inadequate. He favors flexibility in the states' use of secondary funds only after their bridges as well as their roads are shown to be adequate. He also favors 100 percent financing of railroad grade separations, as the money eventually would come back in taxes on increased valuations.

Charles M. Upham, engineer-director of the American Road Builders' Association, completed his earlier testimony. The $1,500,000,000 he advocates instead of $1,000,000,000, should be divided $500,000,000 each for regular federal aid roads, and for special highway projects such as bridges and tunnels; and $250,000,000 each for secondary and urban roads. This larger program, he said, would be of greater general economic benefit.

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Frankland opens office in New York City

F. H. Frankland, director of engineering for the American Institute of Steel Construction, has resigned and has opened his own office as consulting engineer at 271 Madison Avenue, New York. This announcement was made by Robert T. Brooks, executive vice president of the institute.

Mr. Frankland has been retained as consulting engineer on post-war public works for Suffolk County and for a development company. He is also chief engineer of the North River Bridge Co., which has planned to bridge the Hudson River at 57th St. in New York City.

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Five engineers go to Ethiopia for FEA

Six members of a Foreign Economic Administration mission, including five engineers, have left for Ethiopia. They are Perry A. Fellows, assistant chief engineer of FEA and head of the mission; John R. Higgins, Elmhurst, N. Y., construction engineer; Sam A. Anderson, Louisville, Ky., construction and transportation engineer; Dr. Arne Barkhaus, New York City, public health officer; Herbert Woolf, Hyattsville, Md., transportation engineer; and Julius Alsberg, Washington, industrial engineer. Other engineers may go later. The development of transportation to tap natural resources and bring products to marke to aid the war effort will be one of the first problems. The mission was organized through the FEA and the state department.

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Restrictions have been lifted by the War Production Board on the construction of small facilities for railroads. Tunnels, overpasses, underpasses, and bridges can now be constructed, and tracks laid without obtaining specific WPB authorization, provided the cost of materials does not exceed $2500. Materials for the smaller jobs may be acquired either by placing new orders under P-142, or from inventories.

Sanitary engineering services active in Central and South America

Pan American Sanitary Bureau adds six engineers to staff during past biennium. Limited equipment retards development of facilities in some sections.

Requests to the Pan American Sanitary Bureau, for public health engineering service and advice, have so increased during the past two years that the bureau has increased its staff from two to eight sanitary engineers and has also added an entomologist. This growth was brought out in the resume of engineering activities presented April 29 before the conference of Pan American Health Officers in Washington, D. C., by Abel Wolman, chairman of the sanitary engineering committee of the bureau.

Six of these engineers and the entomologist are now operating from bases in Central America, and the other two engineers are stationed at Lima, Peru.

Despite the expansion in the engineering staff, Mr. Wolman said, the facilities that can be made available to Latin American republics are still limited, so that activities have been concentrated mainly in the Central Caribbean area and along the Pacific coast of South America.

One of the most recent engineering undertakings of the staff, reported Mr. Wolman, has been an extensive sanitary survey in connection with the Inter-American Highway project in Central America. Complete sanitary surveys have already been received from Sabinas Hidalgo in Mexico; Solola, Ayutla, Jutiapa, and Escuintla in Guatemala; and from David and Santiago in Panama.

These surveys relate to the sanitary evaluation of water supplies, means for sewage disposal; control of malaria, pest mosquitoes and flies; and housing standards. Similar surveys are to be made for other sections of the Inter-American Highway.

Other engineering services rendered by the bureau included taking an important part in the design and construction of a copper arsenite [illegible] in Peru, which is now in full [illegible] tion; making an estimate of need[illegible] giving assistance in obtaining [illegible] priority equipment and materials [illegible] manufacture of liquid chlorine in [illegible] which is needed for municipal and [illegible] vate water supplies along the [illegible] Coast.

Consulting service provided

The engineers have been con[illegible] on water supplies and sewage dis[illegible] in Mexico, Guatemala, Costa [illegible] Panama, Ecuador, Peru, and Chile, [illegible] cluding cities as large as Lima in [illegible] and Santiago in Chile. Advice has [illegible] extended to include reports on [illegible] chlorination, and design of small [illegible] age treatment installations. An [illegible] creased demand for this type of a[illegible] ance is anticipated.

Proper methods of rubbish and [illegible] bage collection and disposal are [illegible] given special attention at this time, [illegible] cording to Mr. Wolman, as a means [illegible] bubonic plague control and fly breed[illegible] curtailment. A trench-deposit me[illegible] of refuse disposal is proving both p[illegible] tical and economical in Trujillo, Ho[illegible] and other cities in that republic, as [illegible] as in municipalities in the neighb[illegible] republic of Ecuador, have similar m[illegible] ods under consideration.

A. W. Stephens, chairman ACI code committee, dies

Allen Whitmore Stephens, 65, chairman of the building regulations committee of the American Concrete Institute, and an active member of the institute since 1918, died March 31. He was a graduate of the University of Maine, having received a civil engineering degree in 1899.

From 1899 to 1901 he was draftsman and checker for the New England Structural Co.; 1901 to 1903 checker and squad boss for the American Bridge Co.; 1903 to 1905 squad boss for the Phoenix Iron Co. From 1905 to 1926 he was associated with Turner Construction Co., New York City, beginning as a draftman and eventually becoming cheif engineer of the company.

Mr. Stephens then went to The Dresser Co., Cleveland, as vice president; he returned to New York in 1930 and established himself in consulting practice. In the middle thirties he went to Washington as a member of the advisory committee on engineering for the U. S. Treasury Department, Procurement Division.

More recently Mr. Stephens was consulting engineer for the Public Buildings Administration, Federal Works Agency.

MEN AND JOBS

Ary F. Torres, president of the Brazilian Federation of Engineers, is now visiting the United States. Former head of the Sao Paulo Polytechnic Institute, Mr. Torres has been active in the establishment of a national system of standards for materials. He is a vice president of the National Steel Co. of Brazil, and has been serving as chief of industrial production in his country.

Robert B. Brooks, a consulting engineer and former director of streets and sewers in St. Louis, Mo., has been appointed a member of the City Plan Commission. For five years Mr. Brooks was a member of the Missouri Highway Commission and is now president of the St. Louis Safety Council.

J. B. Craig has been named acting construction engineer of the Mississippi State Highway Commission to su[illegible] Frank Bunch, resigned. He was sup[illegible] tendent of Construction at the Chi[illegible] Shipyards at Mobile; superintende[illegible] construction of grading for Cl[illegible] Weaver Co. on the army Air Force [illegible] ply Depot at Memphis, Tenn., and [illegible] recently was chief engineer of gr[illegible] for Oman-Creighton Co. on the C[illegible] Engineer Works near Knoxville, T[illegible]

Lewis S. Finch has been named [illegible] engineer of the Indianapolis Water [illegible] succeeding William C. Mabee, who retired on April 1 after 42 years of service. Mr. Finch came to the company on Feb. 2, 1942, as principal assistant engineer. Prior to that he had been engaged in private practice as consulting engineer sp[illegible] izing in municipal waterworks and [illegible] erage problems.

(*Continued on page 148*)

Flood gives realism to A.S.C.E. St. Louis meeting on flood control

Board of Directors and St. Louis section meet as Mississippi and Missouri inundate thousands of acres in surrounding territory. Half billion dollars of new work proposed for Missouri River.

With the Mississippi River rising to a 100-year flood record on the gage at St. Louis, members of the American Society of Civil Engineers, assembled in that city April 26–27 for a special meeting of the St. Louis Section held in connection with the spring meeting of the board of direction of the society, took part in a discussion of means for controlling floods on large rivers and considered of new plans to control floods on the Missouri. Added zest was given to the meeting by the fact that some of the speakers had taken time off from the fight against the rising waters to participate in the discussion.

Regional attack on floods needed

Consideration of the subject of flood control was opened by Col. Malcolm Elliott, division engineer, Upper Mississippi Valley Division, in a paper dealing largely with fundamentals but using the Mississippi to illustrate his points. "We must recognize," Col. Elliott said, that flood fighting is a regional rather than a local problem, hence it is imperative that all plans be integrated if efforts to protect one region are not to result in greater injury to other regions."

As to the Mississippi River, he said, "the day is past when any one method for flood control such as levee construction is considered practical. It is recognized that both levees and storage reservoirs are needed. Col. Elliott also stated that courage in handling such a flood-control program will be required if efforts to use flood storage for power or irrigation are to be resisted. Power, flood control and irrigation can be integrated in a properly designed and managed plan, he said.

The 1943 flood

Statistics of value in determining the usefulness of headwater reservoirs in protecting lower sections of the Mississippi valley were given by Col. L. B. Feagin, district engineer at St. Louis. Hydrographs of the 1943 flood, he said, indicated clearly that a reasonable amount of storage on the Missouri and its tributaries would have cut the crest of the flood sufficiently to have prevented much of the flooding that did occur. Col. Feagin pointed to the fact that although the 1943 flood exceeded the 1903 flood in height of crest and closely approached the 1844 flood in crest height, its volume was less than either. This indicates that additional storage is needed if the protection now afforded by levees is to be assured in the future.

Huge Missouri program proposed

Brig. Gen. R. C. Crawford, division engineer, Missouri River Division, outlined new plans for the Missouri that are proposed in a report completed last August. It calls for $490,000,000 of new work, bringing the total of authorized and proposed work to $610,000,000, and provides 70,000,000 acre-ft. of storage for the entire basin. A considerable part of this storage in the upper valley will be available for irrigation of arid regions.

Lt. Col. D. B. Freeman predicted that six to seven hundred thousand acres of land would be inundated in the present flood and observed that the valley lands must always depend on adequate levees for protection as reservoirs of adequate capacity in the regions where most of the rainfall is concentrated are not feasible.

Holding water on the land

Results obtained in treating land surfaces to reduce runoff and check erosion were outlined by Howard L. Cook, U. S. Department of Agriculture. In opening his talk Mr. Cook emphasized that such methods were effective in preventing floods only on minor streams and could not be looked upon as of significance in reducing floods on large rivers. Such treatment is of national importance, he said, from an agricultural standpoint and in reducing flood losses in thousands of small valleys.

Both W. W. Horner, consulting engineer, St. Louis, and Col. Elliott, expressed the view that methods of soil treatment that delay runoff, increase the amount of moisture absorbed by the soil, and check erosion may be found to be of significance in reducing major floods if widely applied.

Collective bargaining

A large part of the time of the board of direction meeting and of the local sections conference held on Tuesday was devoted to discussions of the Society's plan for aiding engineers to set up collective bargaining units among the engineering employees of any organization where those employees believe that establishment of such units will be to their advantage.

It was reported at the meeting that 25 sections of the Society have amended their constitutions to make possible the organization of collective-bargaining units in the seven months since the board, at its meeting in Atlanta last October, authorized the sections to take such action. The sections that have taken this action are: Arizona, Central Ohio, District of Columbia, Florida, Georgia, Kansas City, Kansas, Lehigh Valley, Los Angeles, Louisiana, Maryland, Miami, Mid-Missouri, New Mexico, Oklahoma, Oregon, Pittsburgh, Sacramento, San Diego, San Francisco, Seattle, Tacoma, Tennessee Valley, Virginia and West Virginia. A proposal to amend the section's constitution was defeated in the Cincinnati and Northeastern sections. In the Buffalo, Mohawk-Hudson, Nebraska and Toledo sections the directors voted not to submit the question to the local membership. The subject is under active consideration in several of the Society's sections.

Numerically, about 8,000 of the society's 19,500 members have had an opportunity to vote on changing their local constitutions to permit collective bargaining. Of this number 2,426 voted affirmatively and 374 voted against the proposals.

Depreciation report

The board of direction gave its approval to a strong protest against some proposals with respect to depreciation contained in a report now before the National Association of Railroad and Utilities Commissioners for approval. The protest, which took the form of a request to the N.A.R.U.C. that the report be not considered until the society can submit its objections in detail, was prepared by a special committee made up of Past President Henry E. Riggs chairman, Louis R. Howson, N. T. Veatch and Thomas R. Agg.

The annual convention of the society is to be held in Cleveland, Ohio, July 18–20, and the board will hold its fall meeting at Denver in the week beginning Oct. 8, at which time the Colorado Section will hold a special meeting.

The St. Louis meeting was brought to a close by a trip to inspect the Granite City Engineer Depot at Granite City, Ill., one of the great bases where engineer equipment for the Army is assembled and prepared for shipment to the forces overseas.

A review of the discussion at the meeting covering postwar employment, postwar highways and some postwar planning for the St. Louis area will appear in these columns next week.

JOBS OF THE WEEK

HOSPITAL, Roanoke, Va.

Veterans Administration, Washington, D. C., awarded a contract for a 4-building hospital to Caristo Construction Co., Brooklyn, N. Y. at $1,557,500.

MAGAZINE FACILITIES, Seal Beach, Calif.

Bureau of Yards & Dock, Navy Department, Washington, D. C., awarded a contract for magazines facilities at Naval Magazine to W. E. Kier Construction Co., and William Simpson Construction Co., Los Angeles, at $3,218,077.

TEST CELLS, Middletown, Pa.

U. S. Engineers, Middletown, awarded a contract for sixteen additional test cells at Middletown Air Depot to John W. Ryan Construction Co., Inc., New York, N. Y., at $519,700.

AIRPORT, Port Orford, Ore.

Civil Aeronautics Administration, Seattle, Wash., received the lowest bid for airport from R. E. Rush and G. F. Baird, Port Angeles, Wash., at $535,878.

GENERATOR PLANT ADDITION, Springdale, Pa.

West Penn Power Co., Pittsburgh, Pa., awarded a contract for design and construction of a generator plant addition, including extending present power plant, 65,000-kw. steam turbo generator, and pulverized fuel condensing units to Sanderson & Porter, New York, N. Y. The estimated cost is $6,000,000.

FACTORY and OFFICE BUILDING, Springfield, Ill.

Allis-Chalmers Manufacturing Co., West Allis, Wis., awarded a contract for constructing 1-story 40x750 ft. factory and 3-story 75x300 ft. office building to Permanent Construction Co., Chicago, Ill. The estimated cost is $2,500,000. H. R. Helme, Springfield, Ill., is the architect.

DOCK IMPROVEMENTS, Vera Cruz, Mexico.

Marine Ministry, Mexican Government, Mexico City, will construct by its own forces dock improvements, roadways, piers, buildings at Port of Vera Cruz. The estimated cost is $2,000,000.

PLANT, Houston, Tex.

Hughes Tool Co., Houston, Tex., awarded a contract for plant expansion, including machine shop, warehouses, and miscellaneous buildings, all of concrete, brick and hollow tile, to Southwestern Construction Co., Houston. The estimated cost of construction is $1,700,000.

BARRACKS, OFFICERS QUARTERS and SEAPLANE HANGAR, Alameda, Calif.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for constructing barracks, batchelor officers' quarters and seaplane hangar foundations at Naval Air Station, to Stolte, Inc., Oakland, Calif., at $1,423,000.

INCREASED FACILITIES, Shoemaker, Calif.

Bureau of Yards & Docks, Navy Department, Washington, D. C., awarded a contract for the second section of increased facilities to MacDonald & Kahn, San Francisco, at $2,631,000.

Note—Additional bidding and contract news on many projects large and small appear in the Construction News section beginning on page 161.

Theodore B. Parker dies ex TVA chief engineer

Theodore B. Parker, head of the civil and sanitary engineering department at the Massachusetts Institute of Technology for the past year, and previously chief engineer of the Tennessee Valley Authority, died April 27. Mr. Parker was chief construction engineer of TVA from 1935 to 1938 and chief engineer until June, 1943, when he returned to M.I.T., from which he was graduated in 1911, serving the next year as an instructor.

Mr. Parker began his long career in hydroelectric development with Utah Power & Light Co. in 1912, leaving to join the 26th Engineers in the A.E.F. He rose to rank of captain. Returning he became associated with Electric Bond and Share Co., and made investigations and reports on power possibilities of rivers in Nebraska and the east particularly the Platte, Loup, Susquehanna and Delaware.

From 1922 until the early '30s Mr. Parker was with Stone and Webster Corp. on hydro-electric project design and construction. He then served with the Public Works Administration in Massachusetts, leaving the position of acting director to go with the TVA.

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Canol refinery opened at Whitehorse, April 30

On April 30 the Whitehorse refinery of the $130,000,000 United States-financed Canol oil project in northwestern Canada was opened officially and is now ready to deliver fuel for the Allied war machine.

The refinery is linked with the source of supply at Fort Norman by a 595-mi. long, 4-in. dia., above-surface pipeline whose construction was another engineering triumph comparable to the building of the 1523-mi. Alaska highway. It took thousands of Canadians and Americans 22 months to build it, surmounting many difficulties of terrain and weather. Brig. Gen. Ludson D. Worsham, commanding general of the Northwest Service Command, was responsible for the construction work in its entirety.

A full description of the project by Harold W. Richardson, Western Editor, *Engineering News-Record*, has been prepared and will be published in the May 18 issue under the title, "Controversial Canol."

Highway named in honor of road commissioner

By an act of the 1944 regular session of the Mississippi State Legislature, U. S. Highway 84 between Brookhaven and Monticello has been designated "The Hiram J. Patterson Memorial Highway" for the late chairman of the Mississippi State Highway Commission. Suitable markers will be placed along the highway near Brookhaven and Monticello.

OBITUARY

William D. Stephens, 84, former governor of California and a civil engineer, died at Los Angeles, April 19. Born in Ohio, and educated in the public schools, Mr. Stephens joined an engineering corps in 1880 and for eight years was engaged in the construction and operation of railroads in Ohio, Indiana and Louisiana. He went to Los Angeles in 1888 and was elected mayor in 1909, and became governor on March 15, 1917.

Leslie W. Goddard, 84, of Grand Rapids, Mich., died in St. Petersburg, Fla., April 6. He was graduated from the University of Michigan as a civil engineer in 1886, and for more than 40 years was a civil engineer for the U. S. Government in the construction and maintenance of river and harbor facilities on the east shore of Lake Michigan.

Fred E. Carpenter, 66, a consulting engineer of Akron, Ohio, died on April 2 at Cleveland.

A. Elliott Kimberly, 67, sanitary engineer for the Ohio Health Department, died in Columbus recently. Formerly he was in charge of sanitary construction at Fort Knox, Ky., and at the Lockbourne army air base near Columbus.

Thomas Ayhner Somerville, 76, Montreal engineer and contractor, died April 19.

Virgil B. Buckley, 56, Little Rock, Ark., director of the Pulaski County Planning Board, died April 23. He was graduated as a civil engineer at the University of Arkansas in 1912. His first work was with the Frisco and Missouri Pacific Lines and in private practice in the highway field.

C. E. Rice, 51, Massillon, Ohio, city engineer, died April 22 at Columbus.

Ralph E. Esner, 41, died April 19. He was a graduate of the Massachusetts Institute of Technology, and for the past fifteen years was an assistant civil engineer with the Department of Marine and Aviation, New York City.

Orrin L. Finger, 46, assistant Stark County engineer, died April 19 in Canton, Ohio.

News of the Week
Continued on p. 114

CONTRACTS AND CAPITAL

CIVIL ENGINEERING construction volume in continental U. S. totals $41,856,000 for the week. This volume, not including the construction by military engineers abroad, American contracts outside the country, and shipbuilding, is 57 percent higher than in the preceding week, and 18 percent higher than the weekly average for 1944 to date, but is 42 percent lower than the total for the corresponding 1943 week.

Private construction is 65 and 159 percent higher, respectively, than for a week ago and a year ago. Public construction tops last week by 53 percent, but is 58 percent under the week last year.

The current week's volume brings 1944 construction to $637,018,000 for the eighteen weeks, a decrease of 51 percent from the $1,290,346,000 reported for the period in 1943. Private construction, $139,501,000, is 5 percent higher than a year ago, but public work, $497,517,000, is 57 percent lower due to the 4 percent decrease in state and municipal and the 60 percent drop in federal.

In the classified construction groups, gains over last week are in bridges, industrial and public buildings, earthwork and drainage, and unclassified construction. Industrial building is the only class to gain over the 1943 week.

New capital for construction purposes for the week totals $39,963,000. It is made up of $529,000 in state and municipal bond sales, and $39,434,000 in federal construction funds from the First Deficiency Appropriation Act of 1944. New construction financing for 1944 to date totals $405,598,000 and is 17 percent below the $486,035,000 reported for the eighteen-week 1943 period.

CONTRACTS

Continental U. S. Only
(Thousand of Dollars)

	Week Ending May 6 1943	Apr. 27 1944	May 4 1944
Federal	$62,417	$10,076	$23,669
State & Municipal	4,612	8,492	4,675
Total public	$67,029	$18,568	$28,344
Total private	5,208	8,169	13,512
TOTAL	$72,237	$26,737	$41,856
Cumulative 1944 (18 weeks)			$637,018
1943 (18 weeks)			$1,290,346

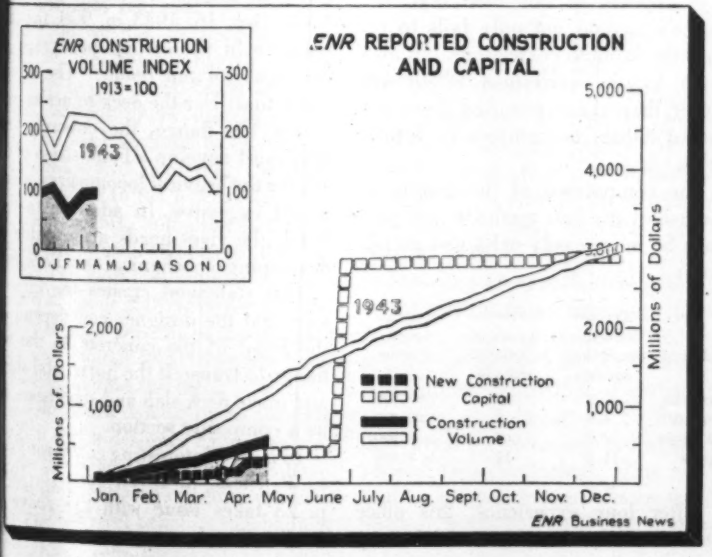
Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

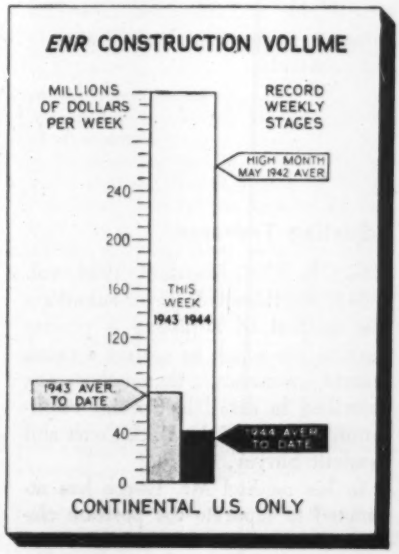
NEW PRODUCTIVE CAPITAL

	Cumulative 1943 18 Weeks	1944 18 Weeks
NON-FEDERAL	$85,685	$160,332
Corp. Securities	2,821	69,919
State & Mun.	71,231	36,633
RFC Loans	8,500	53,780
FPHA Loans	3,133	
FEDERAL	$400,350	$245,266
TOTAL CAPITAL	$486,035	$405,598

ENR INDEX NUMBERS

Index base=100		1913	1926
Construction Cost.	May '44	298.00	143.25
Building Cost	May '44	234.80	126.93
Volume	Apr. 44	106.	46.





Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Down to Earth Planning

Sir: Current discussions of postwar planning make it seem appropriate to offer the following outline of some desirable things to do around many of our small cities:

Through traffic should be diverted from passage through built-up sections, and newer roads constructed to pass such traffic around or beside the towns. This would relieve towns of nuisance traffic, and would speed up travelers and freight. Too many streets lead nowhere in particular. They should be connected in such manner as to make thoroughfares, and to avoid or eliminate unnecessary turns. Miles of existing streets, laid out but ungraded, undrained and unused, can be made useful by a systematic program of improvement and provision of utilities services.

For various reasons, much recent housing has been built around marginal areas. It would be an improvement to build along existing streets with established utilities services. Also, old, substandard housing, used too long already, should be replaced with better and newer types of homes.

In some localities, comprehensive land drainage along small streams, to canalize them and lower the watertable and flood level enough to make the area tillable and free from mosquito nuisance, would be both desirable and profitable.

GEORGE C. LOVE,
Engineer,
Durham, N. C.

Adjusting Traverses

Sir: In *ENR*, March 9, 1944, vol. p. 344, Mr. Russell I. Boyce submits a new method of adjusting a precise traverse for which he claims a much greater accuracy than the one described in detail in Special Publication No. 193 of the U. S. Coast and Geodetic Survey.

In his method Mr. Boyce has attempted to separate the position closure of a traverse into distance and angle errors and to handle each separately in the adjustment. The traverse used by Mr. Boyce has been adjusted by three more methods and a comparison of the results is tabulated below.

Change in Length, One Part In:

Section	Compass	Transit	Rappleye	Boyce
A–1	20,500	13,600	7,700	7,800
1–2	86,500	.....	72,000	10,500
2–3	28,400	29,500	14,200	15,400
3–4	20,700	13,400	13,000	5,700
4–B	28,800	28,800	7,600	22,400

Change in Azimuth in Seconds

Section	Compass	Transit	Rappleye	Boyce
A–1	+ 4.6	+3.7	0.0	− 5.5
1–2	−10.5	−8.3	0.0	−21.6
2–3	− 8.0	−4.8	0.0	+32.4
3–4	− 4.4	−3.2	0.0	−11.0
4–B	+ 7.6	+4.9	0.0	+ 6.9

The "compass rule" and "transit rule" are familiar to all engineers and surveyors and need no explanation.

The Rappleye Method (See Transactions of the American Society of Civil Engineers, Vol. 95, p. 232) was developed for the adjustment of transit and stadia traverses where the lengths are admittedly weak with respect to the angles or azimuths. The method was not intended for use on precise traverse and is included in the above comparison as a matter of interest and to support a contention in one of the following paragraphs.

It appears in this case that Mr. Boyce's method not only fails to reduce the azimuth corrections, but also gives length corrections which are larger than those resulting from the use of either the compass or transit rules.

The comparison of the results of the use of the four methods may perhaps be more easily exhibited as follows:

Method	Average correction to azimuth, seconds	Maximum correction to azimuth, seconds	Average length correction
Compass	7.2	10	1:31,300
Transit	4.8	8	1:26,400
Rappleye	0.0	0	1:14,800
Boyce	15.2	32	1: 9,400

After long experience, this office has found that there is no satisfactory routine procedure by which angle and distance errors can be analyzed and treated separately. No geometric relation exists between the angles and lengths of a traverse and a closure that might indicate length trouble often can be better handled by angle corrections and vice versa.

The fact that the results of the adjustment of the sample traverse by the Rappleye method, admittedly not the theoretically proper method to use in this case, gives corrections which compare quite favorably with those resulting from the use of the Boyce method seems to bear out the contention that there is no simple and straight forward general rule for the adjustment of traverse which will be best in all cases.

Further, we cannot agree with Mr. Boyce that this procedure "requires little, if any, extra work."

C. L. GARVER,
Chief, Division of Geodesy
U. S. Coast and Geodetic Survey

Composite Action

Sir: Numerous state highway departments have used composite construction on their highway bridges but it seems that very few other engineers are well acquainted with this type of work. Any article or discussion about composite action should, therefore, be regarded as being of great interest to the profession. With this in view we submit the following comment on two articles recently printed in *Engineering News-Record*.

In the article "Impact Tests on Railroad Bridge" by E.E.R. Tratman, *ENR*, Dec. 16, 1943, p. 900, the last sentence in the second paragraph of the right column reads: "The report states that: For the deck to act as part of the top flange, the concrete and steel must develop a bond stress of 60 psi. for the heaviest locomotives, which is not excessive. In addition to this bond, the rivet heads are capable of developing mechanical anchorages."

This statement creates the impression that the designer can depend on the bond of the concrete to the top flange to transmit the horizontal shear and make deck slab and steel beam act as a composite section.

In a very interesting comment Prof. C. P. Siess, in *ENR*, Jan. 13, 1944, p. 23 takes issue with the above by stating that few engineers would care

ely solely on bond stress and rivet
ds to resist horizontal shear.
rom long experience in composite
struction and numerous tests with
ic and dynamic loading, we know
one cannot depend on the bond
the transmission of horizontal
ar. Many engineers learned by ex-
ience that the bond of the concrete
he upper flange may be destroyed
shrinkage alone, without the appli-
ion of any live load. That the bond
ffective under design load in some
ctures, not designed as composite
ions does not prove that bond is a
able shear transmitter. Without an
ctive shear transmitter the com-
ite section will not act as such.
erefore, the shear connector is as
portant an element of the composite
ion as the tension steel, or the com-
ssion slab. In the design of the
ar connector the same factor of
ety has to be applied as for these
elements.

In March, 1943, Prof. R. M. Mains Lehigh University tested four com-ite sections in which the concrete b rested on top of the beams. spite well designed shear connec- effectively welded to the top ge of the steel beams, the bond of concrete to the top flange was troyed by static loads of from 1.1 1.5 times the design live load. In vious tests in which the top flange embedded in the concrete and ar connectors were welded to the flange of the beams, the bond of concrete to the beam was destroyed a static load of from 1.5 to 2 times design load, or long before the imate load of 4 to 6 times the de- n load was reached.

In 1936 we had tests made to in-tigate the bond strength of the ncrete to the steel beam in com-ite sections under dynamic load- . The steel sections were entirely bedded in concrete, stirrups ched down to the bottom flange of steel beams, and effective shear nnectors were welded to the top nge. The load was applied at a fre-ency of about 250 cycles per minute. irty to sixty percent of the ultimate d was enough to destroy the bond tween concrete and steel.

All this work demonstrates forcibly fact that a designer cannot rely at on the bond to transmit the hori-ntal shear between the concrete deck b and the steel beam. A mechanical ar connector, designed to trans-mit the total shear, is an absolute necessity to insure reliable composite action. Since the bond is not reliable and never lasts until the ultimate load is reached, it cannot be assumed that it helps in transmitting the shear. Therefore, in the design of the shear connector the bond must be entirely neglected.

It seems to be a mistake to design the shear connector for live load only in sections that have temporary intermediate supports. The shear connector must resist other stresses than plain shear. For instance, through the shear connector the concrete slab acts as a very efficient lateral bracing for the bridge deck and the stresses thus produced are in addition to the shear stresses. Furthermore, according to tests on such composite sections without temporary intermediate supports there seems to be a redistribution of stresses under load that produces additional shear.

Composite construction is not as new as it seems to many engineers. The Public Roads Administration accepts it on federal-aid projects and the A.A.S.H.O. is now writing specifications for composite bridge construction. We know of hundreds of structures — buildings, highway bridges and railroad bridges — designed and erected as composite structures in the last 10 years. Many state highway departments are using it extensively on postwar bridge projects, specifying shear connectors developed by our firm.

C. P. CUENI,
Porete Mfg. Co.,
North Arlington, N. J.

Reinforcing in Walls

SIR: Theodore B. Rights properly questions the rationality of the present standards and formulas governing the proportioning of temperature reinforcement in walls. (*ENR*, Apr. 6, 1944, p. 461).

The purpose of such steel is to prevent temperature or shrinkage forces from opening up the concrete. But the weight of the wall itself tends to prevent the formation of horizontal openings, as is borne out by the fact that usually cracks are more nearly vertical than horizontal. This would lead to the conclusion: There should be more horizontal steel than vertical.

Another observation is that vertical cracks are more apt to occur at the top of the wall than at the bottom. In fact the cracks usually start at the top and work down. A gravity retaining wall, for example, cannot (usually) open up at the bottom, where it is confined by the foundation and where temperature changes are less. But it can easily open up at the top, where these conditions are reversed. If that is the case, there should be more horizontal steel at the top than at the bottom.

The specification that calls for "a certain size bar so many inches on centers both ways" seems irrational.

G. D. HOUTMAN,
Media, Pa.

What Others Say

The following unusual tribute to an engineer is reprinted from the editorial page of the *New York Herald-Tribune*, April 25. Mr. Leonard Wood, who is no stranger to the readers of *Engineering News-Record*, was graduated from M.I.T. in 1901 and joined the Board of Water Supply in 1906. In 1917 he received a leave of absence to serve in the water supply service of the A.E.F., where he held the rank of major. He retired from the Board of Water Supply in July, 1943. The *Herald-Tribune* says:

Mr. Leonard P. Wood is a remarkable man. He also, we fear, represents a type of Vanishing American. Mayor LaGuardia in his Sunday broadcast, told how Mr. Wood, now seventy-two, after having been retired as an assistant engineer of the Bureau of Water Supply on a pension less than his former $6,600 a year salary, had gone right on working at his job—and that one day last year, when he didn't feel well, he asked permission to take the day off. To Mayor LaGuardia Mr. Wood represents loyalty, patriotism and a lot of other fine things; to some persons, we dare say, Mr. Wood will appear only as an aged eccentric with not enough gumption to come in out of the rain. It remained for Mr. Wood himself to put his finger, simply and succinctly, on the real reason why he has kept on working. Said this astonishing gentleman: "I'm interested in certain problems and wanted to continue studying them." Nothing about "helping" his country, no palaver about "duty," no nonsense about being too old to learn new tricks. He was "interested"—an odd word to be used by a job holder nowadays. He seems to be one of those men (they do bob up now and then in all businesses and professions) to whom the day's problems represent not a chore but a fascinating challenge to human ingenuity. American labor and industry might do worse than get together and give Mr. Wood a medal, a laurel wreath or some other handsome form of recognition.

EDITORIALS

VOLUME 132 NUMBER 18

May 4, 1944

Get Out the Plans

OVER THE PAST FIFTEEN MONTHS *Engineering News-Record* has reported proposed postwar projects of the engineered-construction type totaling 7 billions of dollars. This is fine as far as it goes, for in only one previous year, 1942, has this much construction of this type been carried out. But even though the 7 billion dollar figure is believed to include a minimum of impracticable projects, it gives a dangerously false picture. The significant figure is 2 billion dollars, which represents the total of projects for which designs are under way or completed. These are the projects, and the only ones, that will be of any use in the postwar period. In total they measure the effectiveness of our postwar planning. Set off against a reasonable objective of having enough projects for a two-year program ready to go, the postwar planning job to date is far from satisfactory. Its inadequacy is further apparent when it is noted that of the 2 billion dollars of planned projects nearly half are for highways and bridges. In the other classes of construction, real planning has hardly scratched the surface. A critic of planning has described it as "an interesting, stimulating and fascinating intellectual exercise". Too much of current planning is in accord with this definition. Get designs and specifications under way!

That "Or Equal" Requirement

LIKE THE WEATHER, the "or equal" requirement in specifications has long been the subject of much discussion and little action. Here the similarity ends, however, because it is possible to do something about the specification requirement under which bids must be figured using a named product or one that the bidder considers to be equal. As a matter of fact, something has been done. It is in the form of a proposal by The Producers Council of a substitute procedure, which has all the earmarks of solving the vexing "or equal" problem. The proposed new procedure retains the naming of a specific product in specifications so that "basic" bids will be received from all bidders; but it also permits bidders to propose alternate products for which, depending upon their cost, exact deductions from or additions to the basic bid are stated. Such a procedure, it is maintained, will give the specifier the opportunity to compare all "basic" bids, but in addition it will be possible to determine before and not after the contract is let which, if any, alternate product is to be used. Moreover, it gives bidders a wide latitude in proposing products. The Producers Council is urging architect, engineer, contractor and manufacturer groups to discuss the proposal and, if it seems meritorious, to give it a trial. To that plea we add our own. The "or equal" requirement is the subject of too much grief to ignore it any longer.

Will It Work?

SPEAKING of current track maintenance problems at the annual meeting of the American Railway Engineering Association, A. A. Miller, of the Missouri Pacific Ry., said that the current scarcity of some types of materials and equipment makes it necessary for engineers to abandon temporarily their slogan "Will it Pay", substituting the slogan "Will it Work". Many of the expedients that railroad maintenance engineers have been compelled to adopt are not economical, but if they keep track and structures in safe operating condition and at the same time save critical materials they are worthwhile. Mr. Miller cited the reshaping of old track spikes as an example. The reshaping may cost more than a new spike, yet it provides spikes when none can be purchased. The same principle can be applied to other engineering operations, the challenge to engineering ingenuity being in finding substitute materials or methods that will work even though they do not pay.

Highways Must Be Maintained

A VERY TIMELY REPORT made recently by the Senate Special Committee Investigating the National Defense Program deals with wartime transportation. The committee's comprehensive survey of this vital problem is commendable, and shows quite clearly the rapid rate at which motor vehicles and railway equipment are wearing out. But while it deals extensively with the necessity for railway maintenance, nowhere does it mention the need for wartime maintenance of streets and highways. Sound highways are nearly as essential to truck transportation as are sound tracks for rail transportation. Efforts to maintain highways and streets in good operating condition have in many instances been throttled by restrictive policies of

War Production Board, hence omission of high- needs from this report increases the difficulty correcting that situation. Doubtless the report an influence on the WPB in reaching its sion to increase the amount of rail that could rolled this year. A supplemental report on hway maintenance needs by the Senate com- tee might be helpful in getting fuller WPB gnition of the problems of state highway rtments and city street departments in main- ing streets and highways in safe operating dition.

lding Code Guidance

GINEERS AND CITY OFFICIALS who are seeking gestions for improving municipal building codes find both guidance and inspiration on the West st where 225 cities and other government units rate under the same modern ordinance. Indeed, opular has the Uniform Building Codes of the ific Coast Building Officials Conference become 150 other cities in various parts of the country use it.

lthough the code was originated in 1925, it not until 1928 when a committee of building ials and representatives of such organizations he A.S.C.E., the A.I.A. and the A.G.C. under- its extensive revision that it began to be pted widely. Since that time both its principles its provisions have been tested thoroughly.

aramount among these principles is the idea of ping the code constantly up to date. This is e by a "code changes committee" and numerous committees of the Pacific Coast Building ials Conference, which include architects, ctural engineers and building materials manu- urers. These committees meet frequently, y new developments and consider suggested nges. Every three years a new edition of the e is published. Another principle is a constant ving toward flexibility so that the code will it of the use of new processes and new materials he earliest possible date and under suitable safe- rds. Thus it is significant to recall that as early 929 thirty-eight Pacific Coast cities admitted ctural welding under a special provision of the .

o top off its advantages the code, as its name ifies, is "uniform", so that designers and build- ers familiar with its form and provisions can operate in any one of a number of cities with confidence. With such a code available as a guide, it should be relatively easy for any city to check on the adequacy of its own regulations.

Effective Good Neighbor Relations

LONG BEFORE the "good neighbor policy" became a slogan, its principles were being practiced in the field of public health through the Pan American Sanitary Bureau. Last week, engineers and doctors of this eminent international organization met in Washington to review activities extending back 42 years and to lay plans for future work.

In many ways, the Pan American Sanitary Bureau is a remarkable organization. Its creation dates from 1902 at the time of the second International American Conference, and its activities are financed with small pro-rata contributions by each of the 21 participating countries. With a yearly income from this source of only about $100,000 and a tiny staff of engineers and doctors, the bureau has engaged in the challenging task of public health improvement throughout a huge continent. This it does by consultation with and cooperation from health authorities in each country. Overall administration for the last 24 years has been in the hands of Dr. Hugh S. Cumming, surgeon-general (retired) of the U. S. Public Health Service, who is assisted by representatives of other countries ocupying places on a directing council.

Accomplishments of the Pan American Sanitary Bureau cannot be measured with spectacular yardsticks; but if it were possible in some way to perceive the vital, intangible benefits that have been brought to untold millions from health education, the curtailment of energy-sapping diseases and the introduction of sanitation facilities, the record would be impressive indeed.

At this time, when we are about to embark on a worldwide program of relief and rehabilitation, the work of one of our oldest and most realistic "good neighbor" agencies bears examination. It clearly shows that dollars alone are not the answer to an effective program. Much can be done with little—if those that are helped are appealed to and educated to help themselves. It is on this sound basis that the Pan American Sanitary Bureau has operated with great success and effectiveness.

INEERING NEWS-RECORD WALDO G. BOWMAN, *Editor* Copyright, 1944, by McGraw-Hill Publishing Company, Inc.
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ENGINEERING ABROAD AS SEEN BY ENR EDITORS

Public Works in a South American City Built With U.S. Private Funds

Edward J. Cleary
Managing Editor, Engineering News-Record

***Contents in Brief**—In Barranquilla, Colombia, municipal public works management, construction and operation are conducted as a private enterprise financed through loans made by a Chicago banking group. This unique arrangement, which had its origin almost two decades ago, has been carried out under the direction of a North American engineer. Because of its excellent facilities, Barranquilla ranks today as one of the best-operated cities to be found anywhere in the Tropics.*

POSSESSING PUBLIC WORKS facilities that might well be the envy of any city in the United States, Barranquilla, Colombia has achieved this distinction through a unique financial and management arrangement by means of which North American private capital has been invested to provide local improvements.

The arrangement is this: A Chicago banking group supplied funds for public works facilities, in return for which the city agreed by contract to set up an autonomous board that would manage all the properties and collect real estate taxes and other funds to amortize bonds and pay interest charges on the loan. It was further agreed that this board be comprised of three men, consisting of an engineer appointed by the bank, a member of the City Council as its representative, and a member of the local Chamber of Commerce. That this has been a mutually satisfactory arrangement is evidenced by the fact that the contract has been in operation since 1925.

Among other things, Barranquilla proudly lays claim to being the first municipality to build a modern water supply system on the north coast of South America. And with its pure and ample water, paved streets, sanitary sewer system, refuse collection and landfill disposal facilities, it ranks as one of the best-operated cities in the Tropics.

The story of Barranquilla's development reveals how a group of civic-minded Colombians were aided in their aspirations through the zeal, faith and aggressiveness of an American engineer. It begins in the Colombian *cordillera*, where Karl Parrish worked for several American mining interests in the early 1900's. Frequent trips down the Magdalena River to visit Barranquilla convinced him that the city had great commercial potentialities, and in 1919 he abandoned his mining activities to purchase a large tract of land in the city for development as a residential area.

His plans went far beyond this, however. Enlisting the interest of influential residents and business men of Barranquilla in a program of civic improvements—of which rehabilitation of the water supply system was a major element—he proposed that financial aid from the United States be sought. In 1925 he went to a Chicago banking syndicate for the money, where his proposals were received favorably that he came away with loan of 2½ million dollars.

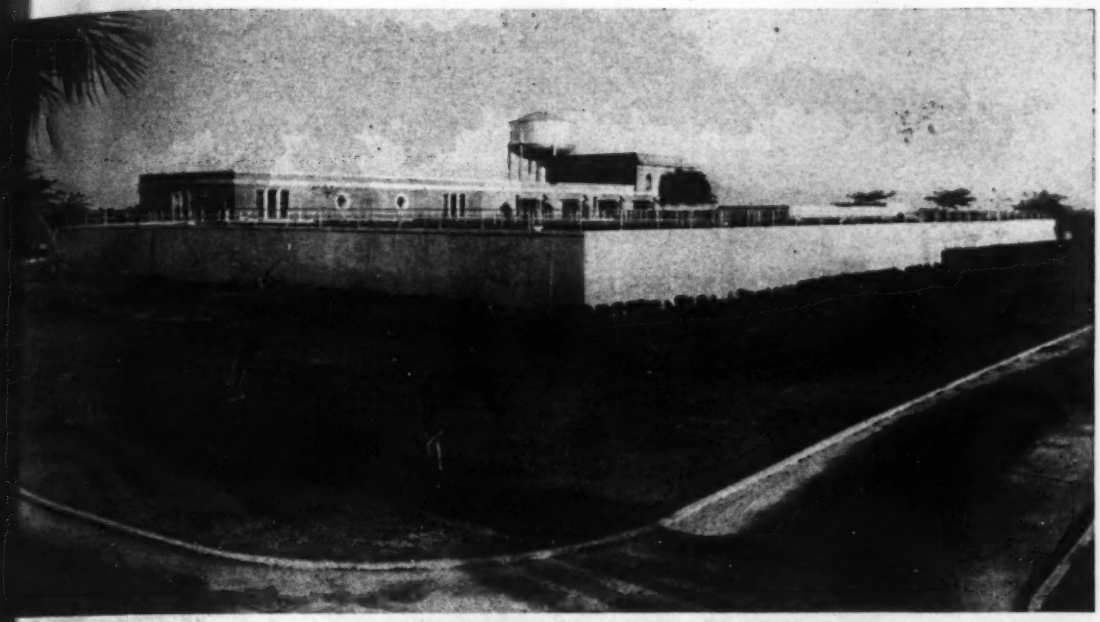
Undoubtedly, one of the most-convincing arguments for securing money was the unique contract he able to offer between the city and Central Trust Co. of Illinois, w acted as trustee for the loan. In the city agreed to the establishment a municipal corporation or e prise (known as the *Empresas P licas Municipales*) to be admi tered by the three-man board m tioned previously. It was specif that the corporation was to build operate public works facilities, also to collect taxes and other enues. After payment of loan ser operating expenses and depreci reserves, the surplus was to go int city treasury.

Today, Barranquilla has compl more than $7,000,000 of facilities, city treasury has been receiving average annual contribution of $ 000 from their operation, and the debt is only $2,000,000.

What the Barranquillians think Mr. Parrish, who died in 1933, is pressed, in part, by these words bronze plaque mounted on the municipal stadium: "The City C cil of Barranquilla consecrates in gratitude to the memory of Karl Parrish who was one of the forceful promoters of the progres the city."

From plan to execution

After the plan of improvements established and the loan arranged,



A recently completed addition to the water treatment plant doubled its capacity to 16 mgd. Here are shown the coagulation basins behind which is the building that houses eight rapid sand filters and control equipment.

ask assumed by Mr. Parrish was d an American engineer to serve rector-general of the board. The fications required were many: ical and administrative ability, cal construction and public experience, a model of diplom- open-mindedness, firmness, pa- and courage.

e man finally selected to occupy ost was Samuel L. Hollopeter, an na Hoosier who had studied en- ring at both Columbia and De- universities. He was working sistant state architect and engi- for Ohio when the proposition to Barranquilla was made in 1925. to this in World War I he had d with the Army engineers in ce and then had knocked around nstruction work.

fter I arrived in Barranquilla," Mr. Hollopeter, "my first impulse o pack and go back. This place ar too primitive for me, my wife our young daughter. But after I tarted and saw what might be plished to change conditions I ted the situation as a personal nge. I've been here 19 years and I still feel that there are a many things that I can help to one."

ese few words sum up the phil- y of the man who has played a r role in the transformation of nquilla from a dirty, sprawling river town into one of South America's most modern and healthful cities. Municipal officials and others who work with him attest to his accomplishments, and his record of service for almost two decades proves it. As one of Barranquilla's executives put it, "If it's in Hollopeter's hands, everything is okay." A higher compliment could hardly have been paid.

Water supply facilities

Chief pride, and the showplace of Barranquilla, is the "acueducto" with its filtration plant. In these regions, a safe and adequate water supply as-

Fig. 2. With the title of "Director-General," Samuel L. Hollopeter has guided the development of Barranquilla's municipal services for almost two decades. The wall plaque is a memorial to Karl Parrish, another American engineer, which was erected by the city council in recognition of his many contributions to the promotion of civic progress.

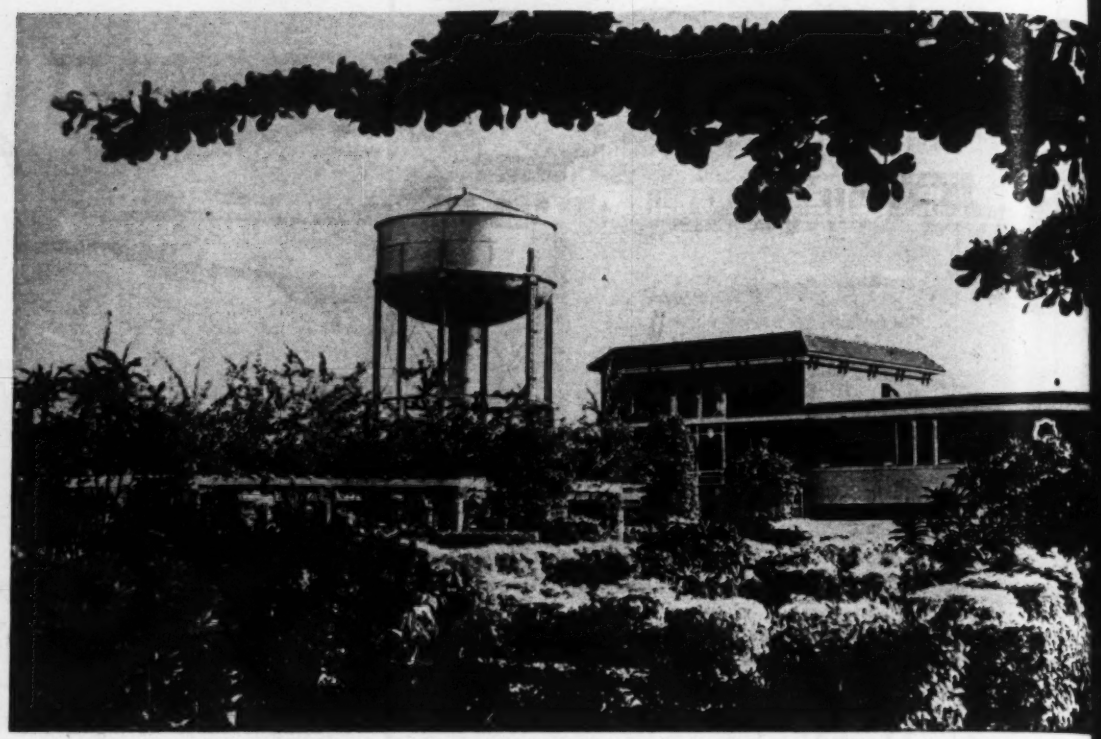


Fig. 3. Chief pride and showplace of Barranquilla is its water treatment plant. Located on a 12-acre site, the gro are magnificently landscaped with trees and formal gardens.

sumes virtues that we in the States accept as commonplace. But even in the States, water supply facilities equivalent to those in Barranquilla would rate plenty of attention.

Located on a twelve-acre plot, the 16-mgd. plant is magnificently landscaped with hibiscus hedges, groves of royal palm and almond trees and a formal garden containing a wide variety of tropical plants and shrubs.

The filtration facilities, which was built in 1929 from designs made by Pearse, Greeley and Hansen of Chicago, was doubled in size in 1941. Incidentally, Charles DeLeuw of Chicago and W. W. DeBerard, now city engineer of Chicago and formerly western editor of *News-Record*, served as special consultants to the designing engineers.

The plant includes 8 rapid-sand filters, each of 2 mgd. capacity, a spray-pipe aerator, dry feeders for adding alum, mechanically agitated mixing basins and four coagulation basins. The water is chlorinated prior to its storage in a one million-gallon clearwell. From the latter, the water is pumped to the city through a 24 in. and a 30 in. cast-iron, cement-lined mains.

The source of supply is the Magdalena River, the size of which at Barranquilla is about the same as that of the Mississippi at New Orleans.

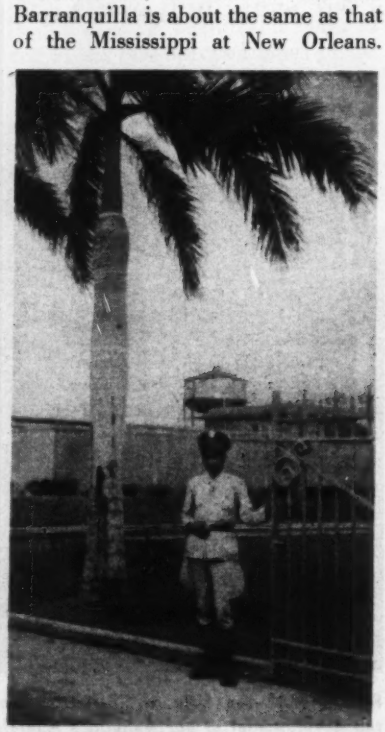


Fig. 4. Wartime precautions in the Caribbean area call for armed guards at the water plant.

Turbidity of the water varies i 300 to 800 ppm., and there is no culty in filtering it after it has treated with 1.4 grains of alum; runs up to 50 hours are not unus

The distribution system inclu two 3-mg. concrete-covered reserv and a 250,000 gal. elevated tank, which "ride on the line" to stabi pressures and provide reserve stora

All large consumers are mete but only 1,900 of the 15,800 serv are as yet provided with meters. though present consumption averag only 50 gal. per capita per day, it planned that after the war many m meters will be installed in order to duce water use still further as well to increase revenue returns.

Sewerage facilities

Sanitary sewer installations ha been provided for about 33 percent the city, and further extensions a planned. The sewers total about miles in length, and range in size fro 8 to 33 in. All pipe is concrete and is made by the city, using a Cracken pipe machine.

No treatment is provided for t sewage, which is discharged direc into the river. The amount is inte

l in comparison with the river nd there are no towns along the n the 12 miles from the city to . Part of the sewage is pumped the low-lying downtown area e river, a 5-mgd. pumping sta- ving recently been constructed. storm sewers are provided, sim- cause it would be economically ible to justify installations suf- to carry off the torrential run- ring the rainy season. Rainfall ate of 8-in. per hour is not un- on, and a single storm may last veral hours.

cheapest and most satisfactory n for handling storm runoff, Mr. Hollopeter, is to slope the so that water will be diverted. e river by the most direct route. on downgrade streets running l to the river the pavement is d at intervals, these high spots g to divert the water into side that terminate at the river or ther drainage channels. This e has proven very successful in g water out of the business dis- f the city, which formerly was d during every rain.

nforced concrete is used almost rsally for streets in the heart of ty. The slab thickness is 6 in. he construction joints are made every 50 ft. Curbs are built up ck, and plastered with concrete. o used for paving are bituminous dam and *caliche*. The latter is a olitic limestone, very abundant y, which is rolled in 2 in. layers a 6 in. base is formed. The top n treated with oil and asphalt covered with hard stone chips. practice is quite similar to that by some municipalities in Flor-

fuse is collected every day, but nount does not bulk large (about u. yd. from a population of 160,- Landfill disposal methods are the inspiration for which, states Hollopeter, came from articles in chnical press followed by a visit w York in 1939 at which time he d New York City practice.

e Barranquilla fill is made to a of about 20-ft., much greater the 6 to 10 ft. generally em- d. But the refuse here is of quite erent character than that in the , consisting largely of dry ma- and containing very little gar- much of the latter is fed to pigs, never reaches the collector.

The fill is covered with about 2 ft. of sandy loam after each day's deposit; this cover material is hauled by truck to the site and then distributed and compacted with a bull-dozer. Privately-owned marshland is being reclaimed, the owners paying a small fee for the service. At the time of the writer's visit, during the hot, dry season, there was no odor on the fill and virtually no flies. However, there were hundreds of buzzards hovering around the fill, reminding one of the seagull migrations to the New York City fills. Flybreeding is curtailed by applying diesel fuel oil with a hand sprayer.

Equipment from U. S.

Equipment from the United States is used almost exclusively in the municipal operations. There are Austin-Western street sweepers, Elgin refuse trucks, Worthington pumps and engines, a Caterpillar tractor, a Koehring mixer, an Adams scraper, American and DeLaval centrifugals, Nep-

Fig. 5. Street improvement measures are graphically illustrated by these "before and after" views. Sanitary sewers are used in Barranquilla, but no attempt is made to provide sewers for the torrential stormwater runoff.

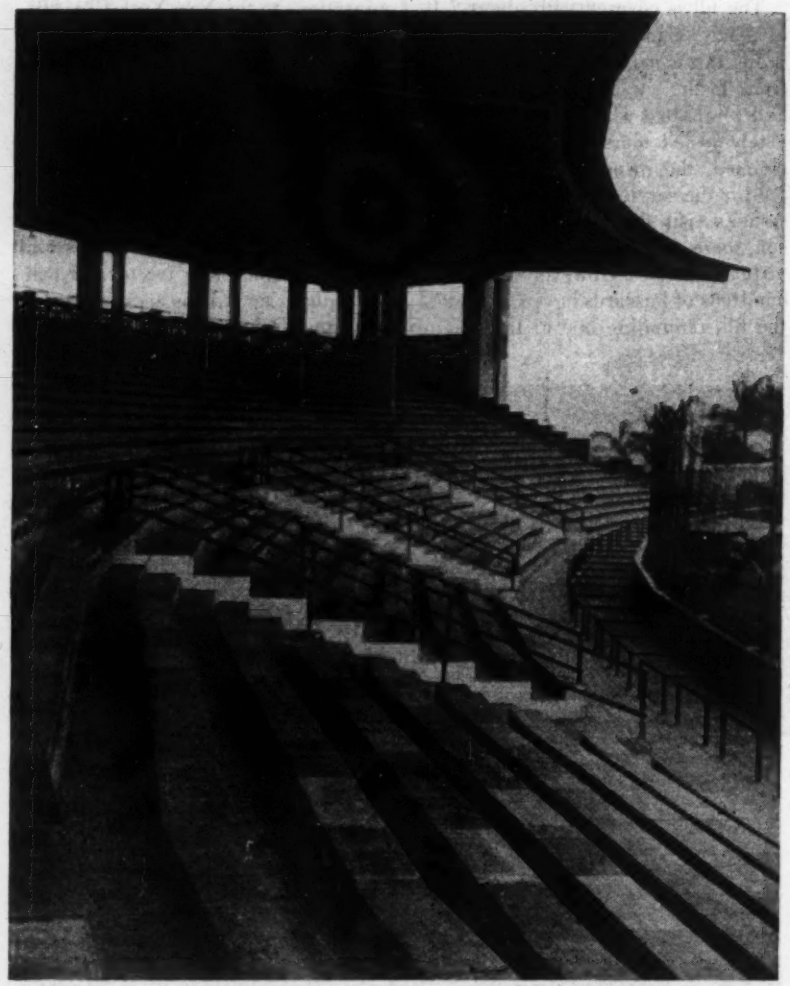


Fig. 6. Municipal stadium, one of the more recent public works department enterprises, is a reinforced concrete structure with precast concrete seats. Baseball and football are favorite sports attractions.

tune meters, Simplex measuring devices, Wallace and Tiernan chemical feeders and chlorinators, Buffalo-Springfield road rollers, Roberts filter equipment, Ingersoll-Rand compressors, and a host of smaller items all bearing names that are familiar to us in the States.

The functions exercised by EPM are illustrated by the chart shown in Fig. 7; it will be noted that this provides a typical line-and-staff type of

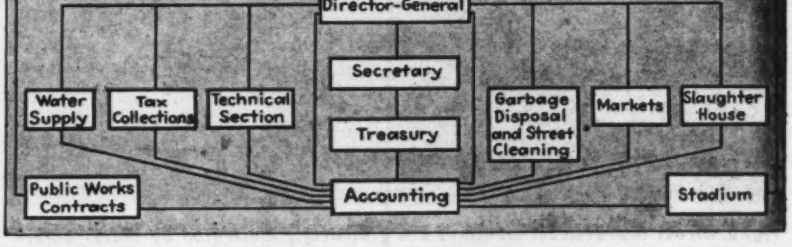


Fig. 7. Functions of Barranquilla's Empresas Publicas Municipales (Municipal Public Enterprises) are shown on this organization chart.

organization. The extent of its ... ness financially is indicated from ... most recent available report (19... which shows that collections to... almost $1,000,000.

Of this amount the waterw... alone provided an income of ... $318,000; real estate taxes prov... $103,600, markets $104,000, sla... terhouse $43,000 and vehicle tax ... 100. The EPM sells license tags ... cars (averaging about $36 per ... because there is no state system ... licensing and virtually the only ... on which one can travel with a ... are those in the city.

Wage and labor rates in Bar... quilla are relatively low, compared ... those in the States; the following ... ing typical of those current at pres... Common labor, $1.05 per day; ski... labor, $1.55 per day; mechan... $3.10 per day; waterworks operat... $93 monthly; and chemist, $... monthly.

A desirable arrangement

Accomplishments in Barranq... demonstrate a workable arrange... whereby foreign investment ... have been geared to meet the ne... of public welfare in a South Ameri... city. One measure of its succes... from the viewpoint of both the ... vestors and the municipality—is ... denced by the fact that the cont... agreement has been in effect for ... most two decades.

That such an arrangement ... broad application was confirmed i... statement made to the writer by ... erto Baena, secretary of the Bar... quilla board of administration. ... stated that a number of cities ... towns in his country have now ... terned the management of their m... icipal services after that of the ... *presas* in Barranquilla.

"In Colombia," said Mr. Ba... "this type of organization enjoys ... highest prestige, and properly so... provides the municipality with ... cient conduct of public service ... tions and offers a safe and sound ... vestment for private capital."

An ocean port, river terminal ... air transport center, Barranquilla ... ready is well-established as an im... tant stopping place for business ... ellers and tourists as well. The pu... works and services in this city of ... most 200,000 population have ... one of the vital factors contributing ... its growth and prosperity.

Graphic Methods for Engineers

D. B. Steinman
Consulting Engineer, New York, N. Y.

***ents in Brief**—Graphic methods offer many advantages in the field of tural design. Not only do they provide a means of problem solving hey aid in visualization of basic concepts and in the development of analytical procedures. The methods given here for determining fixed moments and in general for solving continuous beams illustrate some ese advantages. The author believes they are new. Moreover they pro- a background for an article to follow, which presents a new and ditious method for determining moments in continuous beams and d bents — the method of "linked rigidities".*

LITY IN DEVISING and applying ic procedures should be part of equipment of engineers. Aside their direct usefulness and con- nce, graphic methods have an ational value, being helpful in ying and fixing basic concepts relations. Moreover, the graphic ach offers a potent auxiliary or problem-solving and for the very of new and useful rela-

illustrate these points, the writer elected the familiar field of fixed- moments and continuous beams, resents here some simple graphic ions that are believed to be new. f the constructions are derived ure graphics, without equations rmulas, using only the most fa- r elements of geometry, plus one familiar properties of moment , namely:

slope deflections at the ends of a n (of uniform I) are equal to the reactions of the span loaded with moment area (divided by EI).

this, by simple geometry, the r has deduced the following use- quivalent relation:

fixed-end moments for any span uniform I) will be the end reac- s producible by the *altitudes* of moment triangles (or equivalent ment triangles) acting as concen- ed loads.

dispenses with the necessity of uting moment areas and their rs of gravity.

e extreme simplicity attainable raphic solutions is illustrated in Fig. 1. Given the simple-beam moment triangle $A\,M\,B$ on a span with fixed ends, it is required to find the points of inflexion or zero moment. Draw the circumscribing rectangle;

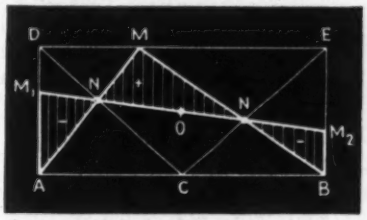


Fig. 1—Beam with fixed ends—To find the points of zero bending moment.

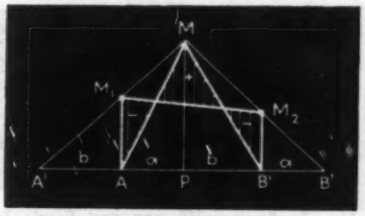


Fig. 2—Beam with fixed ends—To find the fixed-end moments.

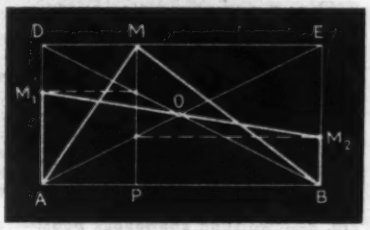


Fig. 3—Beam with fixed ends—To find the fixed-end moments.

the diagonals from the mid-point C of the base to the upper corners D and E will cut the sides of the M-triangle in the required node points N. No analytical solution of the problem can match this in simplicity. The line through the two node points N will be the closing line, giving the fixed-end moments M_1 and M_2. The intercepted ordinates, in the areas shown shaded, will be the bending moments in the span. (Proof of the solution: Draw CO, AO and M_1M. The triangles M_1DM and OCA are similar; hence their connecting lines DC, AM, and M_1O must be copunctal.)

To obtain the fixed-end moments, a more direct solution is given in Fig. 2. The load point P divides the span into two segments, a and b. Extend the span at the ends by the respective amounts b and a, and draw lines to the vertex M. These lines cut the end verticals at the required points, M_1 and M_2. (Proof: AM_1 and BM_2 are the end reactions producible by the altitude PM.)

Another direct solution for fixed-end moments is given in Fig. 3. The vertical through M cuts the diagonals of the circumscribing rectangle in two points giving the required end moments M_1 and M_2. Note that each end vertical is divided into two segments equal to M_1 and M_2. (Proof: The diagonals AE and DB are reaction influence lines.) This construction affords a convenient method of drawing influence lines for fixed-end moments.

Multiple and uniform loads

For two equal concentrations, symmetrically placed, the M-diagram is a trapezoid $AMMB$, Fig. 4. The diagonals of the circumscribing rectangle will cut the M-lines in the equal heights, M_1 and M_2, also giving the altitudes M_p of the component M-triangles. In addition, the diagonals from the load points P to the opposite upper corners of the rectangle will cut the sides of the M-trapezoid in the node points N.

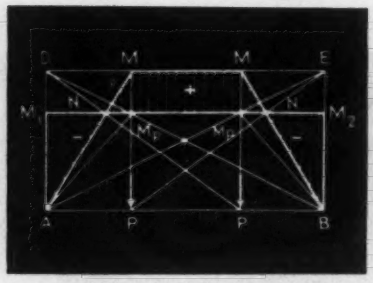


Fig. 4—Beam with fixed ends and two symmetrical loads—To find the end moments.

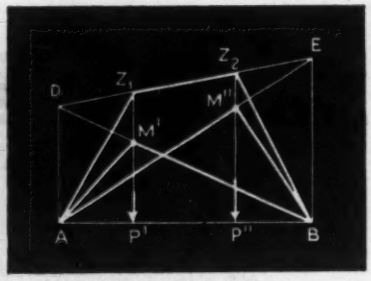


Fig. 5—Two unsymmetrical loads on a span. Given the M-polygon—To find the component M-triangles.

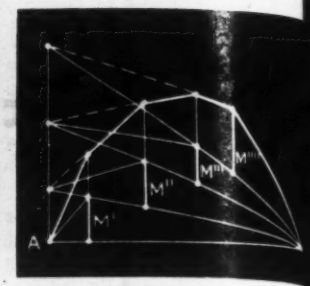


Fig. 6—Moment polygon—To re the polygon into its component M angles.

In unsymmetrical loading, with two or more concentrations on the span, the summation of the individual *M*-triangles will give the *M*-polygon. The solution of the reverse problem, to find the component *M*-triangles when the *M*-polygon is given, is less obvious. It provides an interesting illustration of the resources of graphics.

In Fig. 5, the *M*-polygon AZ_1Z_2B is given. The diagonals of the circumscribing trapezoid will cut the *M*-lines (under Z_1 and Z_2) at the required vertices M' and M'' of the component *M*-triangles. The graphic resultant of M' and M'' would be the altitude of the single equivalent *M*-triangle.

For a series of concentrations on the span, the *M*-polygon may be resolved into its component *M*-triangles by the similar construction shown in Fig. 6. (The equivalent analytical solution of this problem would require the solution of a series of simultaneous equations.) The end reactions for M', M'', M'''—treated as loads will be the required fixed-end moments M_1 and M_2.

For a uniform load covering the span, the *M*-diagram is a parabola, and the horizontal closing line will be at $\frac{2}{3}$ of the altitude. It is unnecessary to draw the parabola. Diagonals from the ends of the span to the known vertex of the parabola will cut the one-third lines of the span at *U* and *V*, the one-third points of the closing line.

In the case of partial uniform loading, the *M*-diagram consists of a triangle covering the span plus a parabola covering the loaded segment. Replacing the parabola by its equivalent triangle, of 4/3 the altitude, we obtain an *M*-polygon which may be treated as in Fig. 5. This solution reveals that to obtain the fixed-end moments, a partial uniform load *W* may be replaced by a concentration of $\frac{2}{3}$ *W* at the center of the load and a concentration of 1/6 *W* at each edge of the load.

Significance of the U and V points

Referring to Figs. 1, 3, and 4, the *M*-diagram and the trapezoid under the closing line M_1M_2 must be equivalent figures (equal areas and end reactions) in order to cancel their respective slope deflections at the fixed ends of the span.

In Fig. 7, the one-third points *U* and *V* are marked on the closing line. The ordinates of the *U* and *V* points (multiplied by *l*/2) are equal to the end-reactions of the M_1M_2 trapezoid, and therefore also of the *M*-area on the span. This yields another useful principle:

> The slope deflections at the ends of a span (of uniform *I*), if the ends are free to rotate, are represented by the *U* and *V* ordinates (multiplied by *l*/2*EI*) of the M_1M_2 trapezoid.

Any change in the *U* or *V* ordinate represents a proportional rotation the joint at the corresponding end the span.

If one end of a span is free to tate while the other is held fixed, closing line M_1M_2 rotates to a position AM_2', passing through end of zero moment, as shown Fig. 7. Since the slope at the end cannot change, the height of *V* remain fixed. Because the rotation about the one-third point, the increase in M_2 is one-half the decrease in (the moment carry-over). Note the new M_2' in Fig. 7 is midway tween the former M_2 and the upper corner *E* of the circumscribing tangle. It may be located directly the construction shown, which equivalent to shifting the *M*-altitude halfway toward the fixed end.

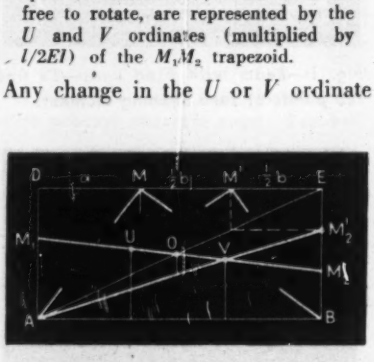


Fig. 7—Beam with one end fixed—To find location of closing line.

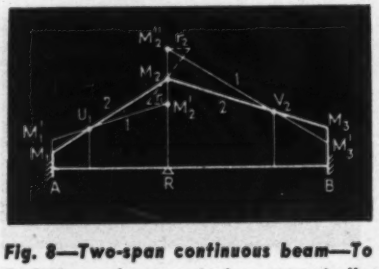


Fig. 8—Two-span continuous beam—To find the end moments by moment distribution.

Two-span beams and frames

At any intermediate support of continuous beam (or joint of a rigid frame) two conditions must be satisfied—the end moments must balance and the slope changes must be equal. The first condition requires equalization of moments (by rotating the closing lines, corresponding to rotation of the joint), and the second condition requires that the respective adjustments of the end moments shall be proportional to the relative rigidities of the members meeting at the joint. The relative rigidities r_1, r_2 —are any quantities proportional to the respective values of I/l (or $\frac{1}{2}I/l$ for members hinged at the outer end).

In Fig. 8, the single-span closing lines (1-1) give the fixed-end moments M_2' and M_2'' over the intermediate support. The vertical interval representing the difference between M_2' and M_2'' is then divided graphically in the ratio $r_1:r_2$, as shown, yielding the balanced moment M_2 at the joint. If the outer ends at *A* and

ixed against rotation, the heights
$_1$ and V_2 must remain fixed, and
closing lines 2-2 are drawn
gh those points. If the beam is
d at A or B, or both, the closing
pass through A or B, or both.
that the spans need not be drawn
same scale; it is merely neces-
to mark the U and V points at
points of the respective indi-
spans. The moment differences
be drawn to an exaggerated ver-
scale.

modified construction — the
hod of Transformed Spans—uses
relative values of r as the span-
ths in the graphic representation.
brings into play some convenient
plifying relations. In Fig. 9, the
spans are laid off in the relative
ths of r_1 and r_2 and the U and V
s are drawn through the $\frac{1}{3}$-points
each span. The known values of
fixed-end moments M_2' and M_2''
then marked on the V_1 line and the
line, respectively, or on any other
of corresponding lines. The con-
ting line $M_2'M_2''$ will then cut the
ine in the required point M_2. This
oined to U_1 and V_2 (or to A and B
he case of hinged ends).

An interesting application of the
hod of Transformed Spans is
wn in Fig. 10. If the two-span
m has fixed ends and the loading
centered, uniform, or symmetrical
hin each span, or zero in one span,
respective initial closing lines
l are horizontal. A line joining
with V_2 will cut the R line at M_2.
the adjusted closing line must also
s through U_1 and V_2. Consequently
closing line $M_1U_1M_2V_2M_3$ will be
traight line. We thus have derived
phically a new and useful prin-
le:

n any two continuous spans with fixed
nds, each symmetrically or uniformly
aded, the moments over the three sup-
orts will be collinear and the closing
ne for moments will be a straight
ne, if the spans are drawn to lengths
roportional to their relative rigidities
I/l).

Three-span beams and frames

Fig. 11 illustrates the convenience
the Method of Transformed Spans
applied to a symmetrical three-
n beam or frame, with both total
ding and individual span-loading
iform or symmetrical (including
case of zero loading in middle or
l spans). By simply joining U_1
h U_3 and V_3 with V_0, the required

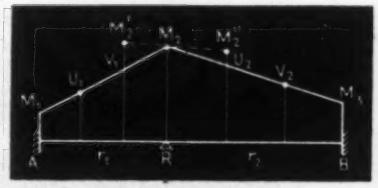


Fig. 9—Two-span continuous beam—To find the end moments by the Method of Transformed Spans.

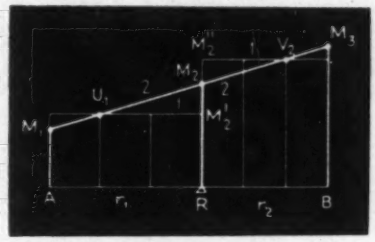


Fig. 10—Two-span continuous beam with fixed ends and uniform or symmetrical loading in each span—To find the end moments.

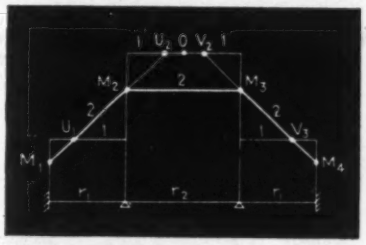


Fig. 11—Three-span beam or frame with fixed ends and symmetrical rigidities and loading—To find the end moments.

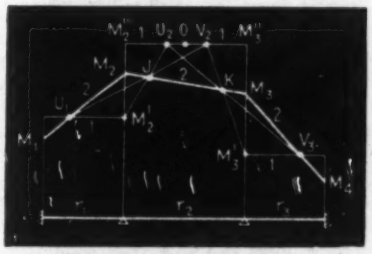


Fig. 12 — Unsymmetrical three-span beam or frame with fixed ends having different uniform or symmetrical loads in each span—To find the end moments.

closing line $M_1M_2M_3M_4$ is directly obtained. By the geometry of this construction the moment areas (divided by EI), between the initial and final closing lines, add up to zero from either end to the center O, corresponding to zero slope deflection at O, as required by symmetry.

In Fig. 12, the structure is unsymmetrical and the loads are different in the three spans, although centered, uniform, symmetrical, or zero within the individual spans. By the proposition developed in Fig. 10, the line U_1V_2 is the closing line for the first and second spans considered alone, and U_2V_3 is the closing line for the second and third spans considered alone. Since U_1V_2 and $M_2'U_2$ are possible closing lines consistent with the loading in the first two spans, their intersection gives J, the left fixed point of the true closing line. The right fixed point K is similarly obtained, and a line through J and K is the required closing line.

The constructions of Figs. 11 and 12 apply to three-member bents as well as to continuous beams.

Conclusion

The foregoing examples of simple relations that appear to have been previously missed are presented primarily to illustrate the usefulness of the graphic approach in visualization, in problem solving, and in the development of new methods.

Based on the same elementary relations, a simple and expeditious general method for continuous beams and rigid frames of any number of members or spans, in both graphic and numerical form, will be presented in a subsequent article.

Prestressed Concrete Ties Used on English Railways

Prestressed concrete railroad ties are being manufactured in England on a mass production basis, according to the Feb. 11, 1944 issue of *Railway Gazette*, London. The steel reinforcement in the form is subjected to a high tensile stress, which is maintained while the concrete is poured and allowed to set. Steel having an ultimate strength of 100 tons per sq. in. is used, care being exercised to insure a high adhesion coefficient between the steel and the concrete. With this construction the tensile stresses are so reduced that shear reinforcement becomes unnecessary. The use of concrete ties of various designs on English railways has increased extensively under war conditions, mainly for sidings and yards, but also on main tracks.

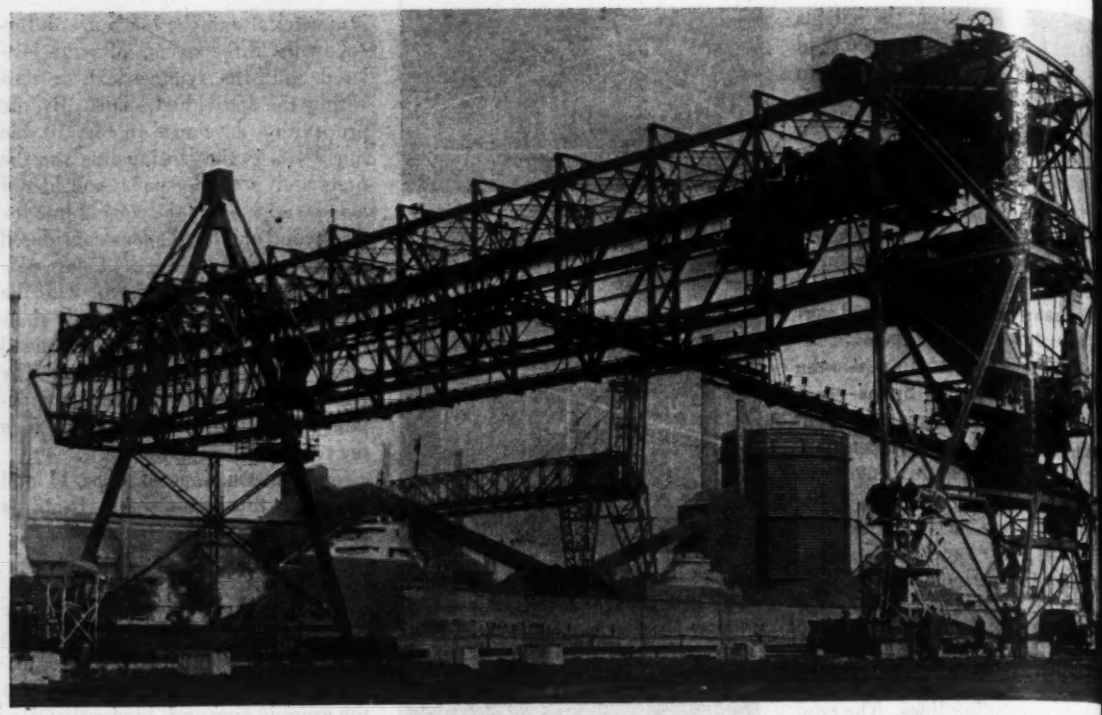


Fig. 1. Big coal unloading crane at Chicago ready for wrecking by burning off columns with thermite. Two thermite p... 10 ft. apart, were placed on each of the two tower legs at the near corner and the single leg at the extreme left.

Demolishing a Crane Bridge with Thermit...

FORTY SECONDS AFTER a switch was thrown to ignite six pots of thermite wrapped around the tower legs of an abandoned coal unloading crane in Chicago, the 1,200-ton structure crashed to the ground ready for the dismantling torches. The bridge, owned by the Interlake Iron Co., Chicago, was demolished for scrap, as it had been replaced two years ago by a belt conveying system that carries coal direct from boats to bunkers in the mills.

The structure was 300 ft. long, made up of two main trusses 25 ft. high, clearing the ground by 60 ft., and carried by two end towers on four trucks running on two standard-gage tracks. At the inshore end, where the operating machinery was located, the towers consisted of double V-legs, a pair to each truck, stiffened by two central suspended legs that hung from the outer legs. These were all riveted box sections. At the outshore end the tower was simply two laced-girder legs, one carried on each truck. These

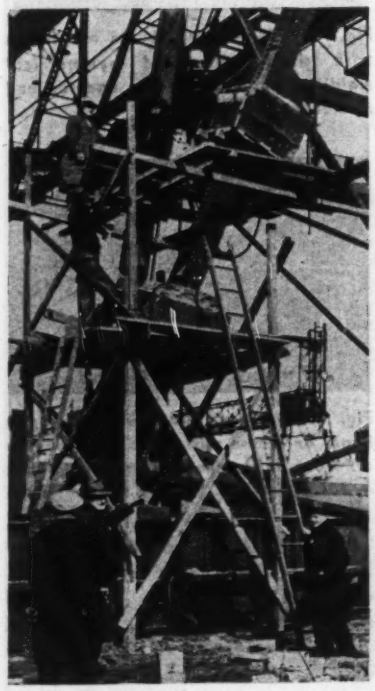


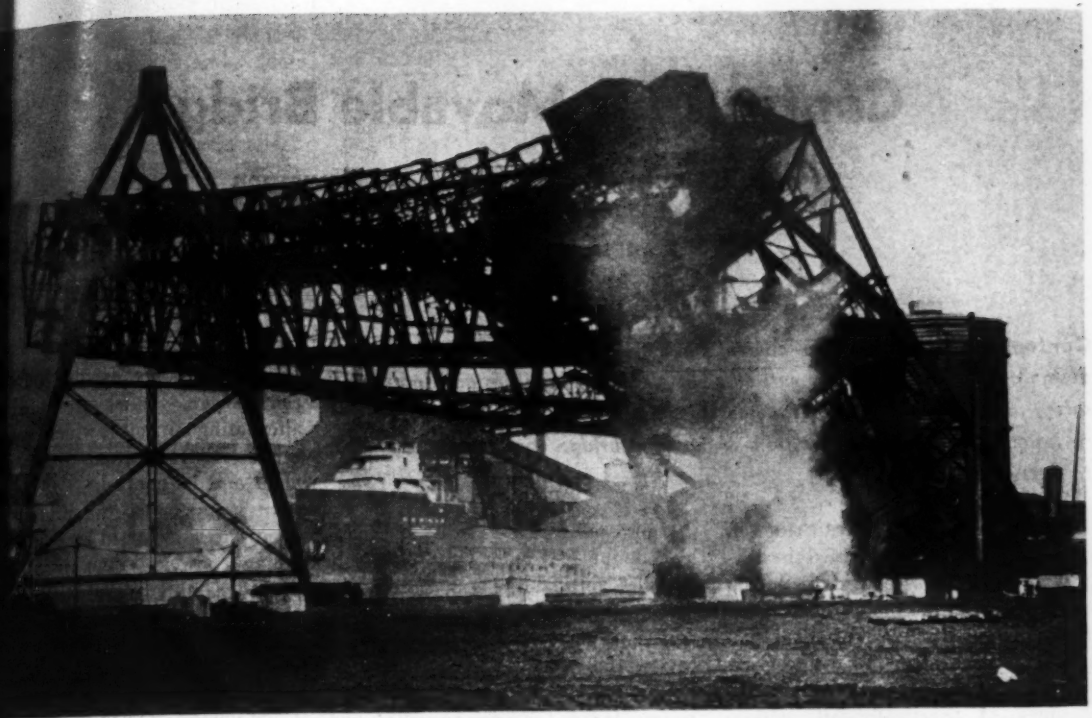
Fig. 2. Hooking up the igniter system on the double tower legs. The thermite was encased in brick-lined wooden cupolas.

single legs were each of heavier to... cross section than were the double l... at the other end.

Speedway Wrecking Company, C... cago, was given the contract for di... mantling the bridge. Remember... their success as a sub-contractor ... razing the east tower of Chicago's C... tury of Progress Skyride in 19... (*ENR*, Sept. 5, 1935, p. 341) wi... thermite, they decided to use the sa... process in toppling the Interlake stru... ture. The plan was to cut all the su... porting legs on one side simultan... ously by burning.

Burn section from legs

Two cupolas or pots were bu... around each of the three legs on o... side, carried on framing clamped t... the columns. These were timber box... about 18 in. high, lined with firebri... and large enough to allow a minimu... width of 6 in. between the lining a... steel. The two boxes on each leg we... spaced 10 ft. apart to burn out a 10-... length of column. After the boxes we...



. The bridge keels over as the supporting legs burn away. Note the lag in burning through the far tower leg, of er cross-section than the nearby columns.

with thermite powder the elec- ignition system was hooked up for action. In the meantime the r legs at the inshore tower had cut away with torches.

Almost instantaneous heat

hen the ignition switch was n the terrific heat of the burn- hermite, estimated from 5,400 to deg. F., melted the steel col- in a few moments and dropped ridge within 40 seconds. Because was more steel in the single r leg than in each of the double the inshore end collapsed just l of the other end, pulling the ore tower inward and warping russes as they fell. Igniting the tower five seconds ahead of the two would have cut all three legs same instant, according to the actor. The structure fell as ed within the prescribed limits. s cut up with acetylene torches andling as scrap.

A. Hagedorn, superintendent for lake Iron Co., represented the r on the job. For the Speedway king Co., J. B. Kolko, president H. M. Bussey, vice-president, did planning and superintendents DeYoung and Milton Rutten- did the work.

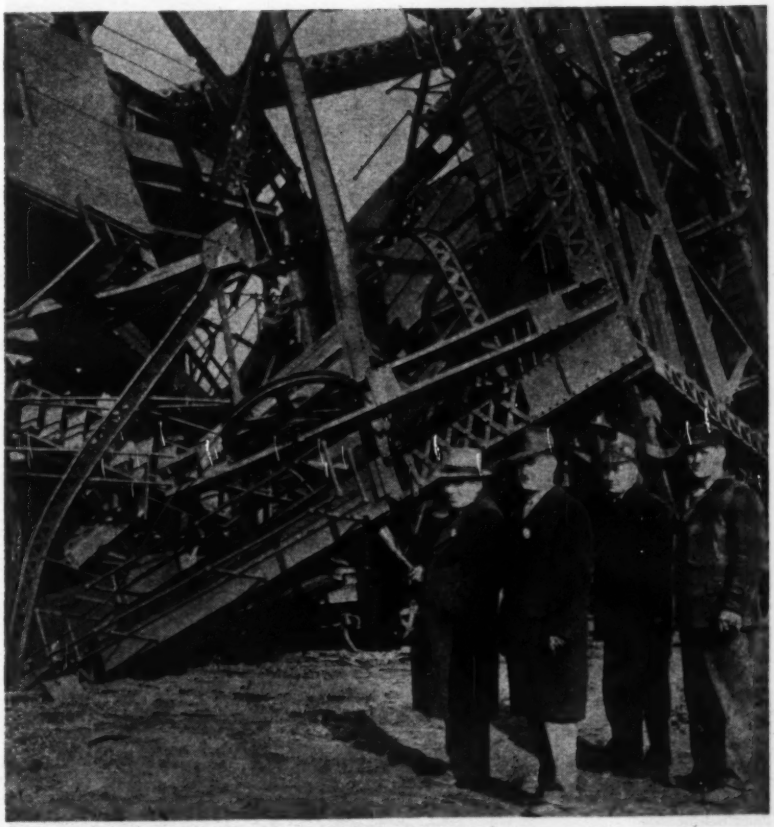


Fig. 4. President Kolko and vice-president Bussey of the wrecking contracting firm, and their superintendents DeYoung and Ruttenberg view the pile of scrap made in 40 seconds from a 1,200-ton crane bridge.

Controls for Movable Bridges

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***Contents in Brief**—Modern control for movable bridges demands careful design of operational equipment, efficient electrical facilities and fool-proof safety devices. Latest developments in these vital design features are reviewed as an aid to the program of movable bridge construction expected to be revived after the war.*

ALTHOUGH WARTIME RESTRICTIONS of critical materials have limited the construction of movable bridges during the past two years, the unprecedented number built from 1937 to 1941 suggests their construction will be resumed immediately after the war. Bridges of practically all modern types are expected to be included in this program, such as swings, single-leaf, double-leaf and twin double-leaf bascules, vertical lifts with center span drive and vertical lifts with tower drives. Therefore, it seems timely to review the control systems that may be applied as well as to indicate the general trends for safer operation and for control of traffic.

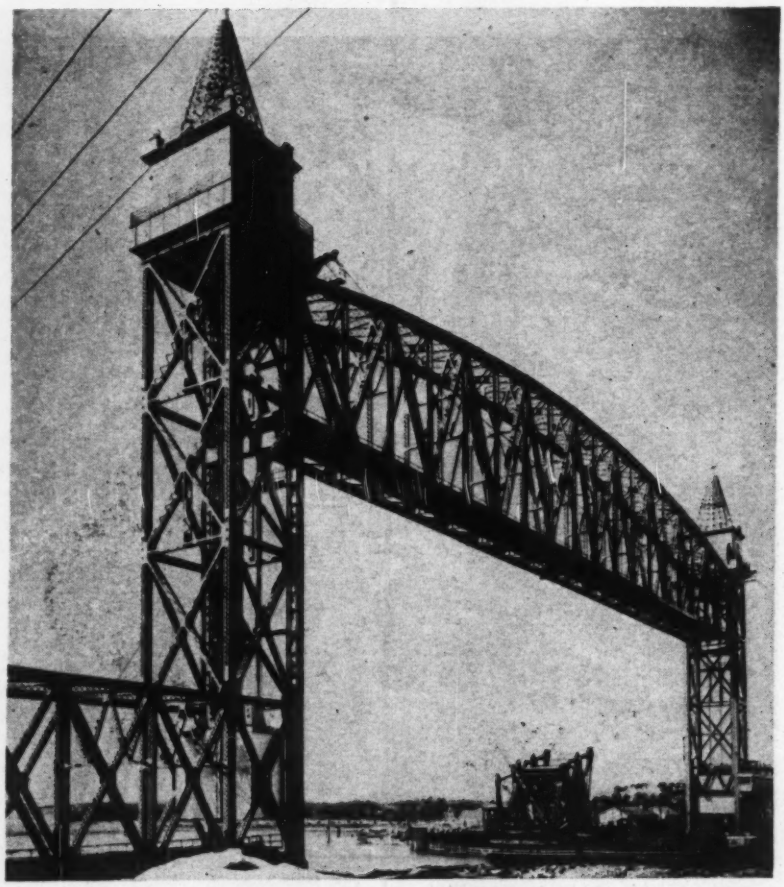


Fig. 1. Operated by a power Selsyn control this vertical lift bridge over Cape Cod Canal is noted for its length of span—544 ft.

The first question is that of po supply, and since existing direct rent power systems are rare, w alternating current is widely availa this article relates only to a.c. eq ment and its control.

In many cases, the bridge eq ment is connected to an existing voltage power system of either or 440 v., either of which is suita However, if an existing high vol system is chosen with a set of tr formers supplying power to bridge alone, 440 v. should be u for the power circuits. This util lower currents and reduces the of primary motor cables, cir breakers, switches, and contact The cost of a 440-v. controller f given hp. rating is therefore than for a 220-v. controller.

Standard control devices are s able for service up to 600 v., they possess sufficient insulation clearances to operate successfully with safety to operators. Theref it is perfectly feasible to use 44 control in connection with 440 power equipment.

Some bridge engineers prefer use less than a 440 voltage on cont circuits to increase the safety fac to the operator and to minimize hazard when coming in accide contact with live parts. If such is case a 440/220-v. control transfor is recommended.

On most bridge installations smaller control wire than #12 used, for reasons of mechan strength. The increase in current sulting from stepping down the c trol voltage requires no increase wire size and thus does not incre the cost of the equipment.

A 110-v. control is not consider satisfactory as some of the interl ing control circuits are quite l and the drop on 110 v. circuits m be too excessive to prevent succes operation.

Power and control cable sizes

rned by two considerations—
ent-carrying capacity and voltage
. Due to the intermittent charac-
f the duty on bridge equipment,
ng plays a minor role in affect-
he choice of cable sizes. In de-
ining the size of power cables, it
ld be recognized that the motors
need to deliver maximum torque
ove the bridge, due to ice and
loads. Since the torque of an
ction motor varies as the square
e voltage at the motor terminals,
llows that each percent drop in
motor lines corresponds to ap-
imately two percent reduction in
r torque.

hen selecting the size of control
s the drop encountered in the
st runs of wire will govern.
n checking the drop in control
its, it should be remembered that
etic a.c. devices have an inrush
nt many times their steady-state
etizing current. Magnetic a.c.
actors and relays are designed to
ate successfully between 85 and
percent of rated control voltage.
, with inrush current flowing
gh a given control circuit, the
should not reduce the terminal
ge at the magnetic device below
ercent of rated coil voltage.

Controlled movement

ovisions are made to limit the
e travel automatically by limit
hes, and to interlock the span
with other auxiliaries to prevent
vertent moving of the span. For
reason, contactors are provided
e span motor primary circuit to
it stopping of the motors by
switches independent of the
ion in which the controller
le is placed.

hether the span motor secondary
it is handled manually on a
switch, or magnetically by con-
rs, is a question of cost, motor
and convenience to the operator.
-magnetic control is best suited
small and infrequently operated
es using motors not in excess
hp. or with secondary currents
exceeding 150 amp. Motor sizes
usually determined by the torque
ired to move the bridge under
me load conditions, rather than
e heating of the motor windings.
efore, span driving motors are
ted on an intermittent rating
, usually 30 min., without exceed-
55 deg. C. rise for totally-en-

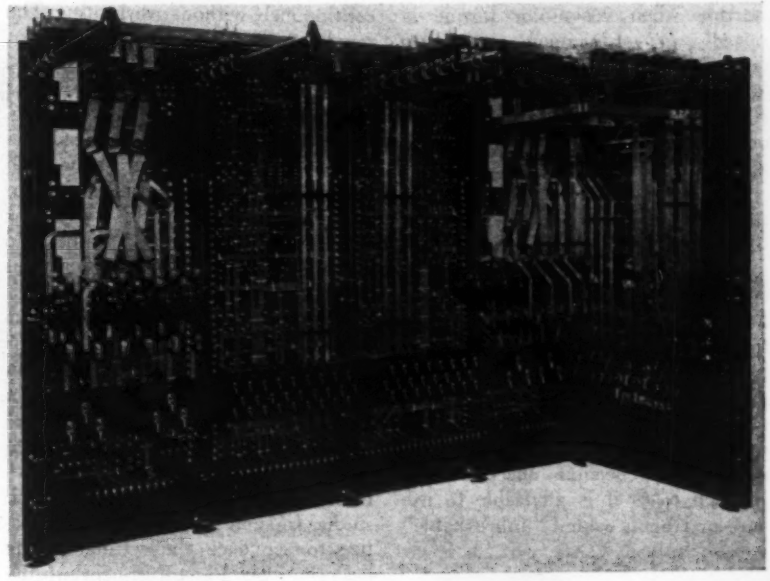


Fig. 2. Power and control connection terminals are compactly arranged in an open type control panel for a bascule bridge.

closed, non-ventilated construction.

Magnetic contactors are designed to carry a certain amount of current continuously without exceeding a certain temperature rise in any of their parts. When they are used intermittently, contactors of 100 amp. and larger can be used at an increased current rating since they have sufficient thermal capacity to carry a higher current for a limited period of time without overheating. When applying a controller to an intermittent rated motor, it should be recognized that a motor of a given design and a certain frame size has a definite locked-rotor current. The largest motor ratings for which contactors should be used on bridge service are shown in the table below.

When selecting contactors for secondary control, it is not possible to coordinate contactor size and motor rating, as secondary currents for a given hp. rating may vary considerably, depending on the speed and the design of the motor used. Therefore, contactors are selected so the motor secondary full load current will fall within the intermittent current rating of the contactor. When double-pole contactors are used, each contact tip carries full secondary current. Thus a 100-amp. continuous, or 133-amp. intermittent rated contactor can be used on a motor having a 133-amp. secondary full load current.

If triple-pole contactors are used in delta connection, each contact tip carries only a portion of the secondary current. It is customary to assume that each contact tip carries 1/1.5 of the secondary current. Thus, a triple-pole contactor which is rated 133 amps. can be used on a motor having a full load secondary current of 200 amps.

MOTOR RATINGS FOR CONTACTORS ON MOVABLE BRIDGES

NEMA Contactor Size	Contactor Rating in Amps.		Max. Intermittent H.P. at;	
	Continuous	Intermittent	220 Volt	440 Volt
1	25	25	5	7.5
2	50	50	15	25
3	100	133	40	75
4	150	200	60	125
5	300	400	150	300

Selection of secondary resistors

Secondary resistors are designed to obtain proper motor torques and speeds on the various controller points, and they should have sufficient capacity to prevent overheating during regular bridge operation. For most bridge installations, NEMA classification 151 will prove to be of adequate heating capacity. Resistors are designed with sufficient total resistance to obtain a starting torque of approximately 35 percent on the first controller point. Such a torque is usually not sufficient to start the bridge, but it will take the back-lash out of the gearing and insure smooth

starting when the motor torque is raised on subsequent controller points. When motors of less than 75 hp. are involved it is good practice to start the span motor with one secondary phase open to reduce the total amount of resistance.

For traffic bridge work, cast grid resistors are ideally suited, if certain limitations are kept in mind. Cast grids have a considerable mass, as compared with other types of resistor units. This gives them a considerable thermal capacity and they can stand high overloads for a short time without dangerous heating. For motors of 25 hp. or less, a cast grid resistor would have such excess current capacity as to become uneconomical. In such cases it is advisable to use wire or ribbon wound "unbreakable" resistor units.

Design of brakes

Brakes are used to stop and to hold the span. Due to the large mass of the span, quick setting brakes, which would bring the span to an abrupt stop, are decidedly not desirable for bridge drives. Thrustor-operated brakes are ideally suited for bridge work because of their smooth setting characteristics.

A thrustor is essentially a motor-driven centrifugal oil pump which, when the motor is energized, works a push rod against the pressure of a spring to release the brake. The thrustor motor is designed to run continuously without overheating. The maximum load which can be thrown on the motor is determined by the design of the hydraulic pump and not by the adjustment of the brake spring. When the motor is de-energized, the brake spring pushes against the push rod, which in turn causes the oil in the housing to circulate. By proper design and adjustment of the passage through which the oil flows, the speed at which the brake sets can be adjusted, permitting the span to be brought to a gentle stop. A number of brakes ordinarily are provided on large span drives, especially when several motors are used. It is customary to provide a brake on each motor, and in many cases machinery brakes are arranged on the jack shafts. In such cases, it is good practice to sequence the setting of the brakes either by adjustment of the time delay attachment, or by limit switch action, and by providing several brake points on the master switch which will practically eliminate any shocks when stopping the span.

The speed of an induction motor can be reduced only by inserting secondary resistance *if the motor is loaded*. When seating a bridge, especially when the span is somewhat heavier than the counterweights, the driving motors will be very lightly loaded, and it may be found impossible to slow the motors down sufficiently to insure smooth seating. This can be overcome by arranging control to release some brakes partially. When drag brakes are they must be fully released when ing the span motor in order to that full starting torque of the is available to move the span. interlocking should be provided prevent partial setting of the brakes, except when the span is seated, to avoid wearing of the

Overload protection

Overload protection on a bridge serves three purposes: (1) protect the power system against circuits; (2) to guard the electric apparatus against damage, and to prevent excessive strain on mechanical equipment. Protection the power system against short cuits is contingent upon the acter of the electrical system to the bridge is connected.

Small bridges may be connected the end of a comparatively capacity feeder, far removed from generating station. The short circ currents possible on such a sy will be small, and a fused switch may be entirely adequate tection. However, when a la bridge is installed near the center a powerful network, high short cuit currents may occur, and the tective equipment must be adequ to cope with them. Circuit breaki must then be used, and their in rupting capacity coordinated with characteristics of the power sy

Either oil circuit breakers or circuit breakers may be used. In cent years, considerable advan have been made in developing circuit breakers with high interr ing capacities, and there is a grow tendency to use such breakers on voltage power circuits on bridges. compared with oil circuit breake they have the advantage of requiri less space, and can be more co veniently accommodated on switc boards.

The intermittent character of duty of a span motor rarely ca overheating by sustained overloa Torque rather than thermal capac determines the size of the span mo tor, and protection should be afford against excessive current peaks, either to internal faults in the mo or to mechanical jamming of drive. Temperature overload rel will not afford suitable protection,

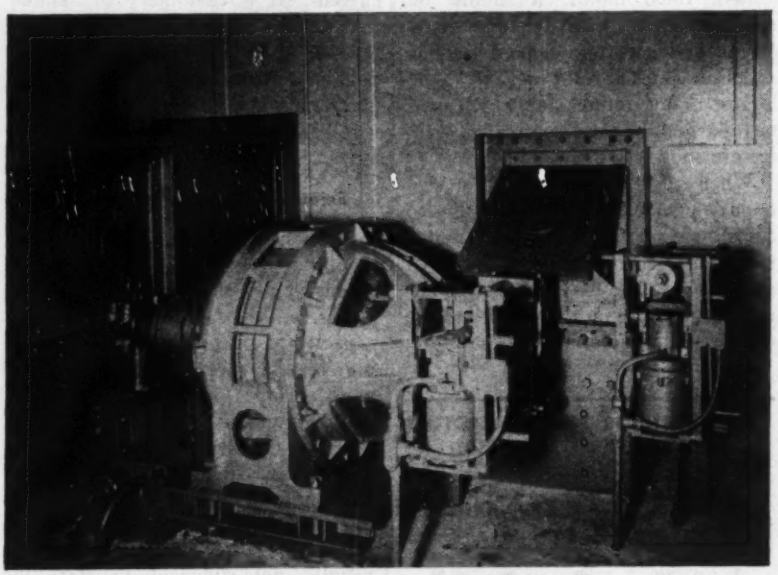
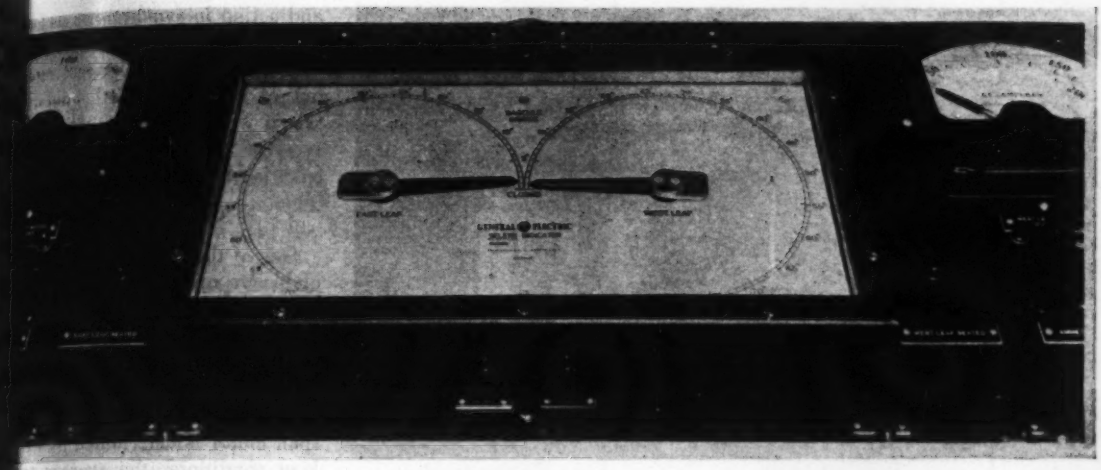
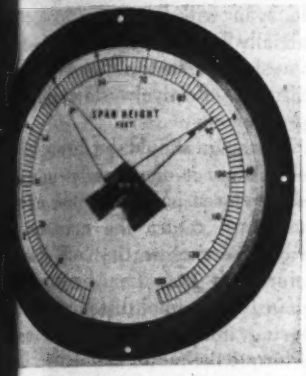


Fig. 3. Adequate power and safety of operation is supplied for a large lift bridge by this wound-rotor motor with thrustor-operated brake.





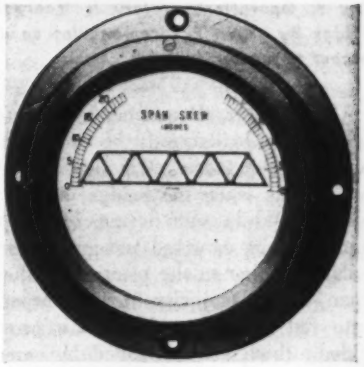


Fig. 4. Bridge movements are controlled at all times by these "Selsyn" indicators: A duplex indicator for a double leaf bascule bridge (top), a height indicator with second hand for a lift bridge (lower left) and a lift span, skew indicator (lower right).

re too sluggish for sudden heavy oads. Instantaneous trip over- nt relays are the most suitable of protection. They should be 250 to 300 percent of normal full-load current. Thus, they ot trip and shut down the span the motor has to start against vy ice or snow load.

Safety interlocking

ails of the safety features in e controls vary a great deal, de- ng on the layout and design of idge. However, safety interlock- ircuit layouts should be as sim- nd straight forward as possible. simpler the safety circuit, the ill be the chance of a faulty op- n, and the easier it will be for maintenance man to locate ds or other troubles in the cable or in the devices forming the circuit.

e basic function of safety inter- g is to insure proper sequence e bridge operation. The first step top traffic across the bridge. For ay bridges, the traffic signals be changed from green to red the traffic gates and barriers closed. For railway bridges, the block signals must be set against approaching trains. Next, the bridge locks or wedges must be withdrawn, and finally, the span is moved. When closing the span the sequence must be so interlocked that the span is seated before the locks or wedges can be driven. Only after locks or wedges are driven can the bridge again be opened to traffic.

Interlocking between various elements of a bridge is by limit switches, which open and close their contacts as a function of the position of the respective drives. Geared limit switches are used generally for this purpose. They are commonly used on traffic gates, barrier gates, locks, wedges and the span. On certain lock designs, track type limit switches are actuated directly by the locking pin. Plunger type limit switches, which are tripped by the span, indicate the seated position of the span and interlock the lock operation with the span position. Such plunger type switches can be set much more accurately than geared limit switches, and they can be adjusted to indicate seated conditions of the span within one-quarter inch.

It is undesirable to hold up bridge operations because of some minor fault in an interlocking device. For this reason, bypass switches can be provided, usually snap switches, by means of which the safety interlocks are shorted out. However, the operation of a bridge with the bypass closed is strictly an emergency operation, and such switches should not be closed unless absolutely necessary. Therefore, bypass switches should be sealed open, requiring the breaking of the seal before the switches can be closed, thus providing a check on whether the bridge has been operated with any safety interlock bypassed. As a safeguard against leaving bypass switches closed inadvertently they should be equipped with a lid which can be closed and sealed only with the contacts open.

Warning lights

In order to safeguard highway traffic, warning lights must be provided on the gates. These red lights are controlled with the gates, becoming lighted when the gates are started from the fully open position and extinguished when the gates are fully raised. They can be made more effective by flashing them in alternate groups by a motor driven flasher. As a further safeguard, audible signals are provided on many bridges, such as bells or horns.

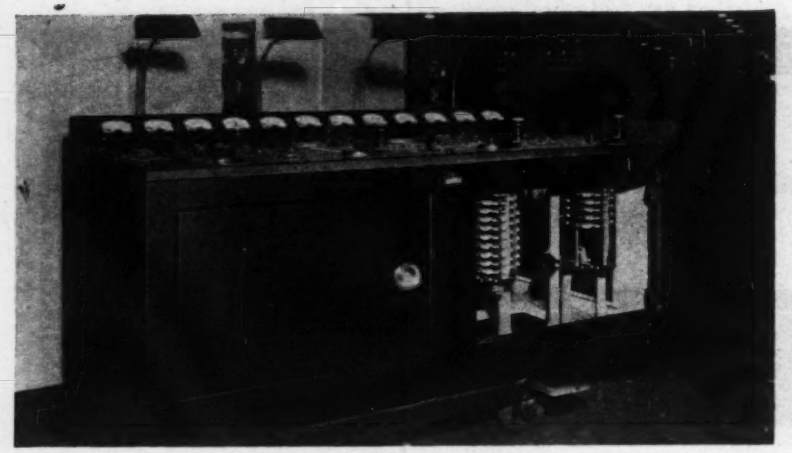


Fig. 5. Operational safety is incorporated in control desk for a large lift bridge by providing drop-handles on doors, foot recess for operator and easy access to master switches.

Under War Department regulations, every bridge must be equipped with red and green navigation lamps to indicate when the bridge is fully opened. While some designs of navigation lamps show red and green signals according to the position of the span, in the majority of cases separate red and green lights are provided, which are controlled by contacts on the span limit switch.

As it is impossible for a movable bridge operator to observe the exact position of each piece of mechanical equipment, indicating lights are provided which show the position of the various drives. Limit switch contacts are used for this purpose. The minimum number of indicating lights to give the operator sufficient information to handle the bridge in proper sequence are: (1) Traffic gates and barrier gates open and closed; (2) locks or wedges driven and withdrawn; (3) railway signals set against approaching trains, and (4) span seated, nearly closed, nearly open, and fully open.

On large bridges involving a greater amount of mechanical equipment, the following indications should be provided for such equipment as may be used: (1) Emergency clutches open and closed if normal and emergency drive is provided, (2) differential clutches open and closed, (3) power supplies available if more than one supply is brought to the bridge, and (4) position of line circuit breakers if they are remotely mounted from the operator's room.

On bridges equipped with a number of brakes the set and release position of brakes are indicated by an auxiliary switch on the brake itself. If a brake fails to release, the additional torque applied by the brake may not be sufficient to reflect itself in improper operation of the drive motors, and the operator has no warning that he may be burning out a brake. This can be avoided by providing positive indication of the position of each brake. Such indicating lights also permit the operator to observe the setting of brakes in sequence, thus assisting him to handle the span in the most efficient manner.

On vertical lift bridges with power selsyn tower drives, it is necessary to synchronize the power selsyns before the span can be raised or lowered. An indicating light should be provided to show that the selsyn tie is established, so that the operator knows when to move the span. Such a light also will warn if the selsyn tie is lost for any reason. On large bridges with heavy spans selsyn operated height indicators are provided since the operator should know the exact position of the span at any time.

On vertical lift bridges with tower drive, it is important to have a continual indication of the position of the ends of the span, as the jamming of a skewed span against the guides may result in extremely expensive damage. Skew indication is provided by two selsyn transmitters, one on each tower drive, electrically connected to a differential selsyn receiver and acting in synchronism as long the span is level. As soon as the s gets out of level, the receivers out of synchronism, the differe selsyn will turn, and a hand on receiver indicates which end of span is high and which end is lo

Control of seating

One of the most important feat of bridge operation is control of movement of the span near the e of travel. A well-designed span trol must bring the span smoothl the end of its travel and seat without shock. As the size of span motor is determined by extr load conditions, the average trip the span will leave the motor partially loaded. Thus, the inser of resistance in the motor secon will not effectively slow down span.

The span should be brought t dead stop at the nearly open nearly closed positions. The opera then must return the master sw or drum switch to the "off" posit before the span can be started again for the final distances of tra During this final travel the amo of torque the motor can deliver is ited by arranging a special cam the master switch which stays clo only on a limited number of poi If the switch is moved beyond t point, the span will stop autom cally and it must then be returned the "off" position to start again fr rest.

The span may be brought into final limit under control of a seat relay, which requires the operator return the master switch to the "o position and then to turn it in the sired direction of travel. Also, a fo or hand-operated bypass push but can be used, which must be held pressed while the span is moved i the final limits. This forces the erator to concentrate on his work. the span is stopped if the byp push button is released. A time de is desirable between stopping of span near the ends of the travel starting of the final seating travel safeguard against "beating" the se ing control by the span carry through into the final limits under own momentum.

When the span reaches the fi open position, it is not necessary position it accurately. Power is sim removed, and the brakes are set

of a contact on the span limit . However, when the span is ht to the fully closed position, st be pressed firmly against its to avoid binding of the span A push button should be pro- to permit setting of some or akes while the motors remain ized. This will firmly grip the and hold it against the seat. is then removed from the mo- by turning the master switch to the "off" position. Thus a nding of the span will be ed.

Vertical lift spans

en vertical lift spans are ped with tower drives in which pan ends are moved by inde- nt motors, both ends of the span be kept level to avoid jamming inst the guides. This may be by use of power selsyn motors k the driving motors on the two s in step to make them run in ronism.

laying out a power selsyn con- t is necessary to lock the power in step before the span can be d. When the power selsyn mo- re of the same size as the driv- motors, their synchronizing e will be sufficient to lock them p. If the power selsyn motors f smaller size than the driving s, their synchronizing torque be insufficient to lock them in against the weight of the span. at case, the control should be ged so the driving motors are ized simultaneously with the selsyn motors.

Emergency operation

what extent provision should de for emergency operation of idge in case of failure of the r span control depends on the tance of the traffic arteries by the bridge and on the nt of money the owners are will- spend in order to assure con- of operation. In the case of infrequently operated bridges, l operation is often resorted emergency purposes. No spe- ntrol provisions are necessary that the brakes on the span n other motorized equipment ave manually operated releases er to free the drives.

more frequently operated s, which are of greater importance to traffic, emergency driving means should be provided. Power failure is beyond the control of the bridge owners but if a bridge is located in a metropolitan area, where power can be brought to the bridge over independent feeders, two independent power lines often can be brought to the bridge. However, only one feeder should be connected for normal operation, with the second feeder serving merely as a standby. Also an automatic transfer arrangement is required so the standby feeder will be connected automatically to the bridge bus if the normal feeder fails.

If continuity of electric power supply is reasonably assured by multiple feeders to the bridge, the next problem is how to safeguard against failure of the equipment on the bridge. Often two duplicate sets of control cables are connected simultaneously in the circuit. Multi-circuit transfer switches at both ends of the bridge permit either control cable to be taken out of the circuit for repairs while the second cable insures continuity of service.

To provide against span motor failure, many bridges are equipped with two driving motors of such capacity that one motor alone will move the span. This affords 100 percent standby capacity in the span drive. On lift bridges with power selsyn tower drives, the synchronizing motors are often the same size as the traction motors, so that in an emergency the synchronizing motors can be used as traction motors. The most complete protection against failure of the bridge to operate because of damage to one or several span motors, is to provide an independent emergency drive. The simplest method is to install a set of separate emergency motors which may be smaller than the regular motors with a correspondingly reduction in operational speed during the emergency.

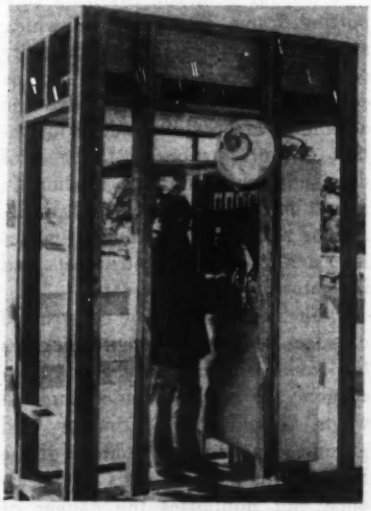


Fig. 6. Control boards for outdoor mounting on swing bridges come laboratory-tested in "packaged" units.

Control panels

Traffic bridges, except the very small ones, require a number of switches, contactors, relays and other devices for their proper operation. This equipment is best assembled on a control panel which is completely factory-wired and contains all interconnections between these devices, thus making it necessary only to install the outgoing wiring at the bridge site. On large bridges, these control panels are of considerable size, and it is worthwhile to give a good deal of thought to their layout. A well planned layout will make it easier to install the great amount of conduit wiring required on such complicated mechanisms as traffic bridges. As each bridge presents its own installation problems, no general recipe can be given on how to design control panels. The best solution will be obtained if the panel designer and the installing contractor cooperate closely in determining the details of the design, especially in the layout of the back of the panel.

A large bridge control panel involves such a great number of control devices that it is not easy to find a particular circuit. Therefore, a neat and logical arrangement of these devices is of great help to the operator and to the trouble shooter, since it helps them to orient themselves in the mass of apparatus on the panel. This point cannot be sufficiently emphasized. When laying out a bridge, sufficient space should be allowed to permit the control designer to arrange his apparatus comfortably. This offers a great advantage to the operators and electricians, who will then be in a much better position to quickly locate and rectify any faults.

Control panels for large bridges ordinarily are too bulky to be located in the operator's room. On smaller bridges, especially the swing and

bascule type, the panels are often small enough to be so installed, making it unnecessary to provide a separate control room. However, when the control panel is in the operator's room, space is usually limited, and an open panel represents a definite hazard, since it is difficult to provide adequate protection against accidental contact with live parts. For this reason, there has been, during recent years, a growing tendency to build bridge control panels either totally enclosed or with a dead front. A very satisfactory solution is to enclose the whole control panel in a cabinet equipped with doors in the front and back, or if space limitations interfere, with removable covers in the back.

When laying out the operator's room it may be difficult to find sufficient space to accommodate a continuous control board panel, in which case it may be built in the form of an "L." The maximum dimension required in any one direction is thus reduced, and a better arrangement of the operator's room will often result. When laying out an L-shaped panel all apparatus requiring regular manual operation should be concentrated on one leg of the "L" so the operator can reach it from his control station with a minimum of steps. The other leg of the "L" will accommodate contactors, relays, etc., which do not have to be within easy reach of the operator.

Protective painting

Traffic bridge control is of necessity installed close to open bodies of water, where the atmosphere contains a high amount of moisture. Consequently steel work and enclosing cases should be given an extra coat of protective painting. For bridges built close to the sea, and subjected to the corrosive qualities of salt water, control devices should have special corrosion-resisting marine finishes to prevent deterioration of the devices, especially the freezing of pins and bearings. Enclosing cases and steel supports should have extra corrosion-resisting priming coats to prevent rusting.

Many waterways are closed to navigation during the cold season of the year, resulting in many bridges being shut down and left unattended during that time. Cold temperatures have no adverse effect on control panels, but dampness does. The ideal way to prevent condensation is to heat the rooms housing the control equipment. This may not always be feasible. However, as enclosed panels are more apt to be subjected to condensation because of the confined air space, space heaters should be provided to keep the enclosed air circulating. Space heaters providing 6.5 watts per sq. ft. of enclosing case surface have been found satisfactory on a number of installations.

Control desks

The complete operation of a bridge requires a multitude of devices to be operated and observed by the operator. Not only is the control for the span proper involved, but likewise a considerable array of switches, push buttons, and the like is required for the auxiliary drives, lights, signals, etc. Also, indicating lights, selsyn indicators, and meters are required to permit the operator to properly supervise the bridge and to know at a glance the exact position of each component element of the bridge.

It has been generally accepted that the most satisfactory method of installing these devices is to assemble them on a control desk. Interconnections between devices are factory-assembled without the use of conduit. A control desk can be tested as a unit in the factory, where facilities and skilled personnel are available, and where such testing can be done more accurately and with less effort than at the installation.

A control desk consists of a supporting frame and a top on which are mounted indicators and manually operated devices. Compound tops as compared with steel tops have the advantage of providing added insulation. Front portion of the control desk should be horizontal, to simplify operation of the switches on it. Raising the rear portion of the top makes it easier to observe instruments and indicators mounted thereon.

Desk frames should be constructed of sheet-steel of sufficient thickness to provide adequate strength. Sharp corners are to be avoided and all welds should be continuous and ground smooth to the contour of the bends. This not only adds to appearance, but minimizes the danger of tearing clothes. Inside of the desk should be accessible from the front and from at least one side. Doors should be provided in front to fa tate inspection of the inside. D and removable covers should cupped and set into recesses in frame to increase their stiffness prevent buckling. The desk fr should be smooth as possible wit projections against which the o ator may stub. Thus, concealed hinges and drop type handles are sirable. Near the bottom of the front a recess should be provide give the operator toe room, so he may stand close to his work.

Inside wiring of a control should be laid out with care firmly supported. Outgoing wi should be terminated at indel marked terminal boards, easily ac sible from the side. As most tricians are right handed, it is e for them to connect up termi boards if they are arranged on right hand side of the desk. D wiring to the terminal boards sho be kept back of the boards as fa possible, to allow the electrical tractor a maximum amount of w ing room.

When operating the bridge at ni many operators prefer to have control room darkened for easier servance of traffic on or under bridge. Illumination should be p vided which sheds light only on top of the desk, without striking eyes of the operator.

Packaged control

For small bridges, especially semi-magnetic control, the con panel may be arranged inside control desk, since only a small n ber of contactors, relays and t switches are required. This cons tion conserves space and facili installation. The entire control rives at the bridge site as a s unit, requiring only to be set up its prepared foundation and nected to the outgoing wiring. conduits need be run between and panel, thus saving install expense. As all interconnections tween panel devices have been stalled and tested at the factory considerable amount of time can saved with this equipment.

On infrequently operated bri both the magnetic devices and manually operated devices may combined in a single, weatherp enclosed unit suitable for mount out of doors.

Sewer Construction Practice at Memphis

***nts in Brief**—Where bad soil was encountered in building a 15-mile roject, horizontal timber shoring was used to advantage in expediting ction. Seven crossings under railroad tracks and highways were con- d within timber-lined tunnels excavated without shields. Several were built on concrete mats in the form of dual sewers, a smaller rovided for normal flows and a larger conduit for peak loads. The es, with precast concrete steps and special covers, were designed to itical materials.*

L DESIGN FEATURES new to construction practice at Mem- enn., were introduced in build- long outfall in that city. The ction procedure involved a of innovations.

truction included an outfall war plant area in the south- portion of the city westward miles along Nonconnah Creek Mississippi River, plus five f laterals at the upper end of fall. Most of the outfall, which n diameter from 30 to 48 in., ilt in open trench, but seven were required to carry the nder highways and railroads. n siphons were also con- d.

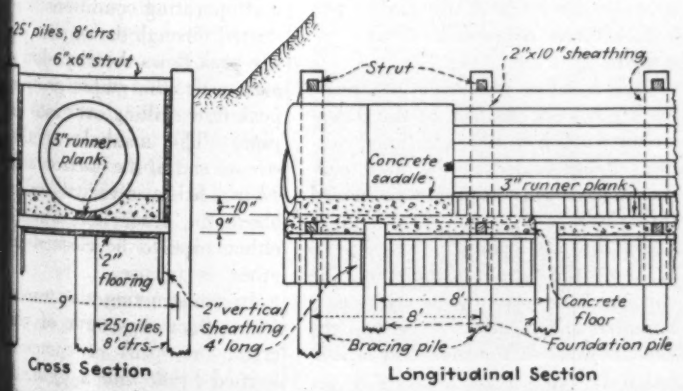
of the five contractors en- on the project chose to do the ion for the open-cut work by e, the fifth using a hoe. Exca- for most of the line revealed topsoil underlain by sand and which presented no special problems in laying the tongue-and-groove, reinforced concrete pipe. However, one section of about 200 ft. near the downstream end required excavation through a very fine wet alluvial soil with the characteristics of quicksand, 90 percent of the material passing a No. 100 sieve.

Heavy shoring proves necessary

The first construction plan was to build this section on a timber floor laid directly on the alluvial soil. This proved unsatisfactory because of the upthrust of the semifluid bottom and the slippage of the unstable banks.

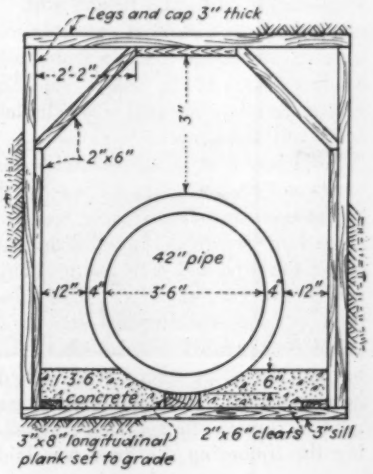
Horizontal shoring nailed to two rows of piles as shown by Fig. 1 was next tried and proved successful. The method used in building this shoring was as follows: (1) Two rows of 25-ft. long timber bracing piles were driven, one at either side; (2) earth between the two rows was removed simultaneously with addition of the 6x6-in. struts between the piles and the 2x10-in. sheathing on the face of the piles; (3) then 25-ft. foundation piles along the centerline of the sewer were driven; (4) vertical cutoff sheathing 4 ft. in length was installed; (5) a 2-in. thick floor was placed beneath the lower struts, and finally (6) a 3-in. runner plank was added along the top of the foundation piles and passing over the bottom struts. It should be noted that the vertical sheathing eliminated an opening between the floor and the sidewalls, and made the shoring much tighter than it otherwise would have been.

In laying the pipe a stiff 1:2:4 concrete floor, level with the top of the runner plank, was first added. Next the pipe sections were lowered in place by a crane, and finally a concrete saddle of the same stiff mix was placed to a depth of 10 in. above the top of the runner plank. Above the concrete saddle compacted earth backfill was added until 2 ft. of cover over the pipe was provided. The timber bracing, including all sheathing, was left in place. This type of shoring proved so successful



Horizontal sheetings nailed to a row of piles at either side of trench successful in constructing 200 ft. of sewer where an unstable soil with portles of quicksand was encountered.

Fig. 2. Solid box bracing permitted the tunnels under the highways and railroads to be driven in free air without the use of shields. When the backfill was placed all the lumber, except the diagonal braces, was left in position.



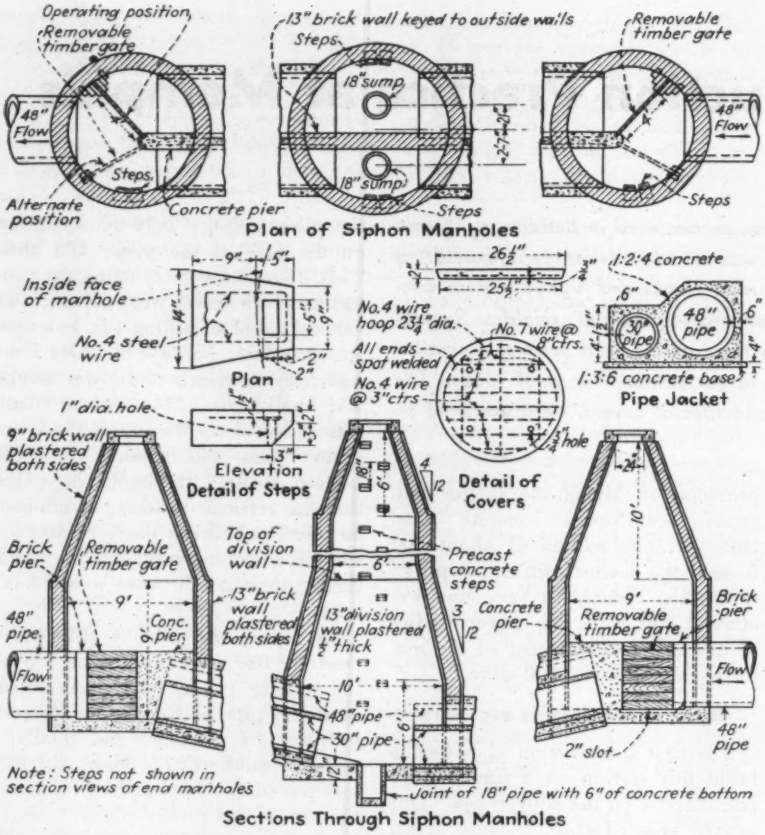


Fig. 3. Siphons were built with two parallel pipes of unequal size, the smaller for normal flows and the larger to aid in carrying the peak flows. Timber gates in the upstream and downstream manholes may be shifted to aid in cleaning the siphon. Precast concrete steps eliminated the need for metal.

that those in charge believe it offers many advantages for other projects.

Tunnels built from two headings

Construction of seven tunnels to carry the outfall under highways and railroads constituted another important phase of the work. Varying in length from 70 to 108 ft. and with a maximum cover of 31 ft., the tunnels were excavated in free air from two headings without the use of shields. The material penetrated was alluvial soil, sand and gravel.

Solid box bracing of second grade hardwood timber (Fig. 2) was used in the tunnels. The bracing was arranged to permit 3 ft. of clearance above the pipe and 1 ft. at the sides, which proved sufficient. With the type of soil encountered the face could be extended only about 18 in. beyond the point where bracing had been installed. Wheelbarrows were used to remove the spoil. In installing the timbering the floor was laid first to provide a solid working platform followed by the side and overhead pieces.

The original plan was to lay the pipe for the full length of the tunnel and then add the backfill. Construction of the sewer through the first tunnel showed that better progress was possible by backfilling after two 4-ft. sections of pipe had been installed.

Pipe sections were slid into place by hand, work starting at the downstream end and the additional sections being added at the high end. As each length of pipe was moved into place it was embedded with a 1:3:6 dry-mix concrete to a line 6 in. above the bottom of the pipe. The concrete was prepared by truck-mounted mixers and delivered to the desired point in the tunnel by wheelbarrow.

The tongue and groove joints were sealed with a 1:2 cement-sand mortar containing 10 percent of lime. Addition of the lime improved the [illegible] tar's workability and increased density.

For backfill an alluvial topsoil [illegible] livered by wheelbarrow and [illegible] pacted in place with pneumatic [illegible] pers was used. When placing material in the trench only the braces at the upper corners of timber bracing were removed, other lumber being left in place.

Dual pipe siphons

Construction of fourteen si[phons] involved some interesting work. [Each] siphon was built as two parallel [pipes] sized pipes, the larger one—equ[al] diameter to the line—carrying [storm] flows, and the smaller designed [to] take the average flow (Fig. 3). [The] upstream leg of the siphon was constructed on a 20 to 25 percent [slope]. At the upstream end of this [leg] gate manhole was constructed, [and] at its lower end a vertical [shaft] about 25 ft. long was used. [The] downstream leg was constructed [on] the same slope as that of the upstream section but with a manhole at [both] ends, making three manholes [in all] for each siphon.

Since the siphons were built [on] stable soil, a 4-in. thick mat of [lean] concrete was first put down to [pro]vide a working platform (Fig. [4]). On this mat the two pipes were [laid] and encased in 1:2:4 concrete [as] illustrated by Fig. 3, which also [shows] the design of the manholes.

Manholes with timber gates

A study of Fig. 3 reveals that [the] upstream and downstream manholes are equipped with timber gates [that] may be shifted to divert the [main] flow through either pipe. Under normal operating conditions flow is [con]ducted through the smaller pipe. [Dur]ing peak flows the diversion gate [acts] as a weir, the major portion of [the] peak flow spilling over into the [larger] pipe. The manhole at the [down]stream end of the horizontal legs [has] 13-in. brick division walls [rising] above the grade line, which permits either pipe to be cleaned while [the] other is in use.

In constructing the manholes [a] 12-in. floor was built of plain [con]crete, the walls of common [hard]burned brick with a ½-in. thick [coat] of plaster inside and out, and [the] and cover of concrete. In the [case] of the middle manhole of a [set]

p was provided at each side division wall by sinking one f 18-in. dia. concrete pipe in or and plugging the lower end pipe with concrete (Fig. 3).

ast concrete steps, lightly rein- were substituted for the cast ype formerly used for Mem- anhole construction. The con- teps (Fig. 3) are 5 in. thick, long and vary in width from in., being beveled along radial They are imbedded 9 in. It d that the precast steps are satisfactory. Not only can inserted quickly, since no half must be used as in adding cast eps, but to get in and out of nhole is as easy as with those iron.

hole rims of plain concrete

rim for the manhole covers signed as a non-reinforced cap ½ in. square and 9 in. thick over the top of the manhole. on covers salvaged from a pre- project were used for a few es located in the street.

remaining covers were of con- einforced with scrap steel. ere made 2 in. thick and of dia. (Fig. 3). Laboratory f the concrete covers showed en they are supported on all hey can withstand a 5,800-lb. aced on a 6x6-in. wood block at its center. Thus, these were considered satisfactory other than under traffic.

onstructing manholes where lines join the main line an- nnovation new to Memphis construction was introduced. perience had shown that on ance work it was frequently y to open up the T-joint be- he vertical pipe had become To provide access to the e pipe had to be broken, and, e joint had been cleaned, a tion was added. This prob- overcome by using a remov- ecast concrete slab above the shown by Fig. 6. Reduced ance costs are expected to

duce the cost of making fu- w connections, certain man- ere equipped with the first a branch line (Fig. 7). This ich was plugged, will elimi- ch work in cutting a hole in of the manhole. Addition

Fig. 4. First operation in constructing a siphon was to put down a 4-in. thick slab upon which the two parallel pipes could be laid. A 1:3:6 concrete was used for this base.

Fig. 5. Manhole construction at the junction of the downstream and horizontal "legs" of a siphon, in which a brick intermediate wall carried above the hydraulic grade line was employed. This partition permitted one pipe of the siphon to be cleaned with the other in operation.

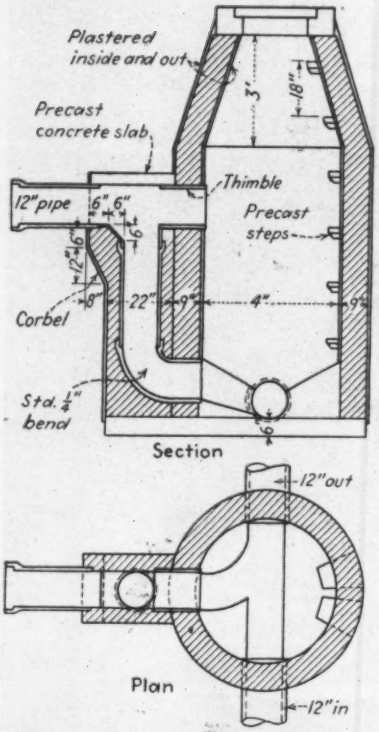


Fig. 6 Maintenance experience at Memphis has shown that lateral drop connections at manholes often become clogged, the cleaning of which required destruction of the first section of the lateral. To eliminate the need for breaking the pipe, the new manholes were constructed with a precast slab as shown above.

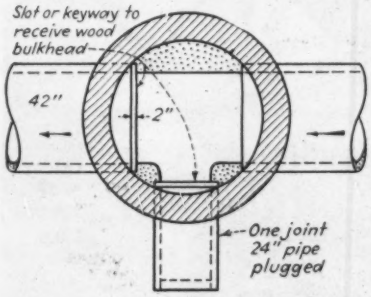


Fig. 7. At manholes where future connections for a bypss line could be expected, the first section for a branch line was installed and keyways for timber bulkheads were provided in order that sections of the sewer may be dewatered for cleaning or repairs.

of the stub cost little, and it may permit a considerable saving in the future.

The manholes for the siphons were constructed sufficiently large to provide straight-line flow for each of the two pipes. The size of the manhole for a siphon with 30- and 48-in. pipes is indicated on Fig. 3. The manholes for smaller siphons were reduced in size.

Sizes of the manholes other than at the siphons are as follows:

Diameter of Largest pipe	Diameter of manhole
8 to 24 in.	4 ft.
30 to 42 in.	6 ft.
48 in and up	6 ft.

Cost of the project is estimated at $1,000,000. Construction required about five months.

Those in charge

The work was done by the city of Memphis with funds provided by the Federal Works Agency, which represented by George Stryker, struction engineer for western nessee.

Acting for the city, O. P. W is commissioner of public w William B. Fowler, is city engi T. E. Maxson, is design engineer W. T. Mattox, is assistant engin charge of sewers and drainage tures.

General contracts were let to following five firms: Smith Atlanta, Ga.; G. M. Ferris, A Tenn.; F. D. Harvey, Memphis; uel Kraus, St. Louis, and Fo James, Memphis.

Stresses in Conical Bottoms of Tan

Chesman A. Lee
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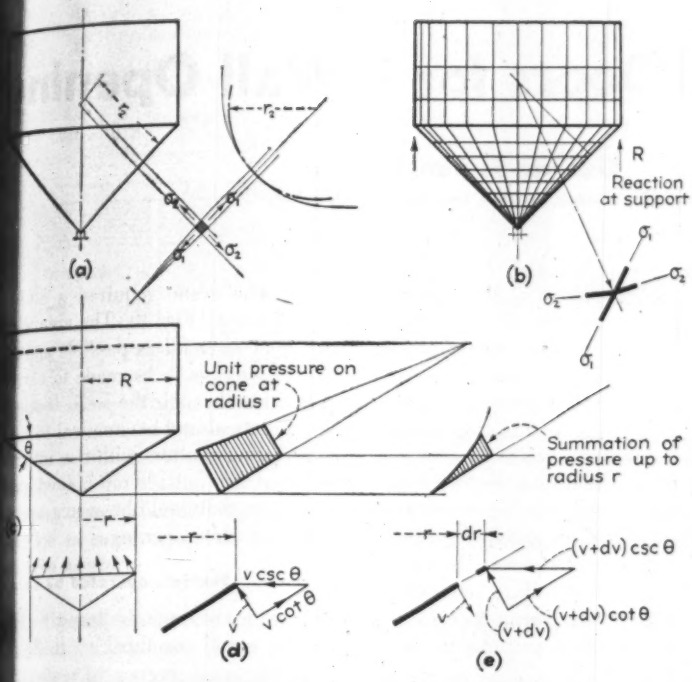
***Contents in Brief**—Formulas are proposed for calculating stresses conical bottoms of cylindrical tanks, which are believed to simplify design. The analysis includes simple equations for the direct solution principal stresses.*

PRINCIPAL STRESSES in the conical bottoms of cylindrical tanks have been figured for some time by methods which never have seemed entirely satisfactory to some engineers. For instance, one large tank-manufacturing company reports that as long as the bottom of a tank is not thinner than the sides, they regard it satisfactory in design, assuming a reasonable cone angle. Other tank-men have been reluctant to trust conventional formulas in designing an aluminum tank having a conical bottom.

Ketchum's Structural Engineers Handbook, 3rd edition, p. 449, gives the conventional formulas and their derivations, which are based in part on membrane stress theory. In Fig. 1a the radius for principal stress σ_1 is infinite; consequently the analysis cannot be completed using that theory. However, if the cone be cut horizontally and considered as a "free body," σ_1 can be determined by conventional methods as has been done in the past. Also stress σ_2 as figured from membrane-stress theory, lays along a "conic section" and actually component along the meridian.

The following analysis is offe a better way of calculating stresses; one which gives both σ_2 by solving one set of equ Certain fundamental develop it have been omitted in the inte simplicity. If the cone is cons made up as a basket or netw elements as indicated in Fig. can be solved easily since it is ally determinate. Consider the or zonal elements, as being p made up of short struts. The onal elements are of course str line and continuous. The load vided between the various in tions. Furthermore the mesh made as small as necessary changing the principles invol the nature of the stresses figu regarding the mesh as of infini dimension the problem can be directly using very simple The solution follows:

At any point in the cone a u is loaded by the unit pressu



By considering the cylindrical tank represented in (a) as made up of a ... of elements, as indicated in (b), it can be considered statically deter... Unit pressures on the tank bottom are shown graphically in (c), and ... resolved into their various components in (d) and (e).

...ding to its depth below the sur... ...vel of the enclosed liquid. Cut ...e horizontally and treat it as a ...body" of radius r, loaded with ...mmation of pressure to that ... and supported by a distributed ...n whose unit value is

$$\frac{w}{r} \sec\theta = \frac{1}{2} r \left[D + \left(R - \frac{2}{3} r \right) \tan\theta \right] \rho \times \sec\theta \qquad (1)$$

...w equals the weight of con... ...cluded in radius r and ρ equals ...sity of the contents.

...unit v may be resolved into ...ents as indicated in Fig. 1d, of ...he inclined component equals ...idional stress:

$$v \times \cot\theta = \left[\left(R - \frac{2}{3} r \right) \tan\theta \right] \rho \times \csc\theta \qquad (2)$$

...r, the analysis has been consis... ...h the conventional way of fig... ...tresses, although the conven... ...formulas neglect the weight of ...e for the sake of simplicity. In ...g σ_2 some rather simple calcu... ...t be used. It is obvious that ... is shear, and this fact has ... difficult at first to accept the ...n, although its value is always ...thin reason for any reasonable ...s of the tank's shell. Next, con... ...extension to the cone of infin... itesimal width with one of the assumed hoops at distance dr. Refer to Fig. 1e and consider cone supported by the hoop. The load on the hoop equals the reaction $(v + dv)$ which has the components $(v + dv)$ cot θ and $(v + dv)$ csc θ. The inclined component is of course taken by the radial elements while the horizontal component acts to produce a hoop-stress which obviously is compressive. The analysis can be completed now by using this horizontal component in determining σ_2.

For simplicity and convenience, the word "stress" has been used somewhat loosely; v and σ_1 are obtained in lb. per lin. in. and must be divided by the thickness of plate to get the result in psi. The unit stress σ_2 also can be determined by using the common formula for hoop stress:

Force in outer hoop,

$$F = (v + dv) \csc\theta\,(r + dr) \qquad (3)$$
$$\text{or } dF = (v\,dr + r\,dv) \csc\theta$$

The cross-sectional width of the hoop must be made equal to the infinitesimal spacing of hoops and therefore this force is distributed along the length of (sec θ) dr. The unit stress is

$$\sigma_1 = \frac{v\,dr + r\,dv}{dr \times \sec\theta} \times \csc\theta = \left(v + r \frac{dv}{dr} \right) \cot\theta \qquad (4)$$

By differentiating Eq. (1) it becomes

$$r \frac{dv}{dr} = \frac{1}{2} r \left[D + \left(R - \frac{4}{3} r \right) \tan\theta \right] \rho \times \sec\theta \qquad (5)$$

and substituting in Eq. (4),

$$\sigma_2 = r[D + (R - r) \tan\theta]\, \rho \times \csc\theta \qquad (6)$$

Again this value must be divided by the thickness of plate to get the unit stress in psi.

Stress of opposite sign

Note that σ_2 is compression instead of tension as usually figured.

However, σ_1 and σ_2 were determined from the two components of v and are in equilibrium with that force. Analysis of a basket-work cone with finite mesh indicates a combination of meridional elements in tension with latitudinal elements acting as struts in compression. This analysis has been extended merely to cover an infinitesimal spacing and it must be concluded that σ_2 is really compressive. Note that the value of σ_2 is approximately twice that of σ_1. In other words, the absolute value of σ_2 is the same as usually figured but it is opposite in sign.

The chief objection noted so far to the above method is that comparatively thin plates are not capable of carrying much moment. The conventional formula assumes they carry no transverse shear. What is really meant is that when principal radii have reasonable values, neither one near infinity, it is not necessary to consider shear, as the principal stresses in tension will suffice to hold the shell in equilibrium.

Computation for restraint

In figuring the restraint from a flat bottom, on cylindrical wall of a large storage tank it is necessary to use equations as developed by Timoshenko in Strength of Materials, Volume No. 2.

These equations are based upon a multiple integration of the shear equation and can be used successfully even though the wall is comparatively thin in relation to the physical dimensions of the tank. There is no valid objection to using shear in the stress calculations.

Use of these same equations permit rational design of tanks without a reinforcing angle being required at the junction of the conical bottom with the sides.

Weathertight Doors for a Wall Opening

George F. Booss
Structural Engineer, Ebasco Services, Incorporated, New York City

FOR REASONS OF ECONOMY and to conserve critical materials, particularly structural steel, a 35,000-kw. turbine extension to the Louisiana Power & Light Co.'s steam-electric station at Sterlington, La. was built as a semi-outdoor, brick enclosed installation provided with positive ventilation. This plan required that an existing indoor crane serve the old and new turbines alike, which in turn required an opening in the end wall of the old building sufficiently large for passage of the overhead crane.

Construction of the opening is of interest because of the methods followed to provide watertight shutters that could be opened and closed quickly. After considering doors of many types, steel rolling shutters were chosen for reasons of their permanence, appearance, quick action, and resistance to fire. The War Production Board had restricted the manufacture of new steel shutters, but the use of second-hand rolling steel shutters rebuilt by the North American Iron & Steel Co. was permitted.

The crane required a 50-ft. opening (Fig. 1). The area was kept as small as possible and no provision was to be made to carry loads through the wall. It was practical and economical to use rolling shutters with two intermediate and two outside top hinged guide posts that could be swung up to for a clear opening.

Shutters operated by hand

Two of these shutters are 12 ft. high and the third 17 ft. 2½ in.

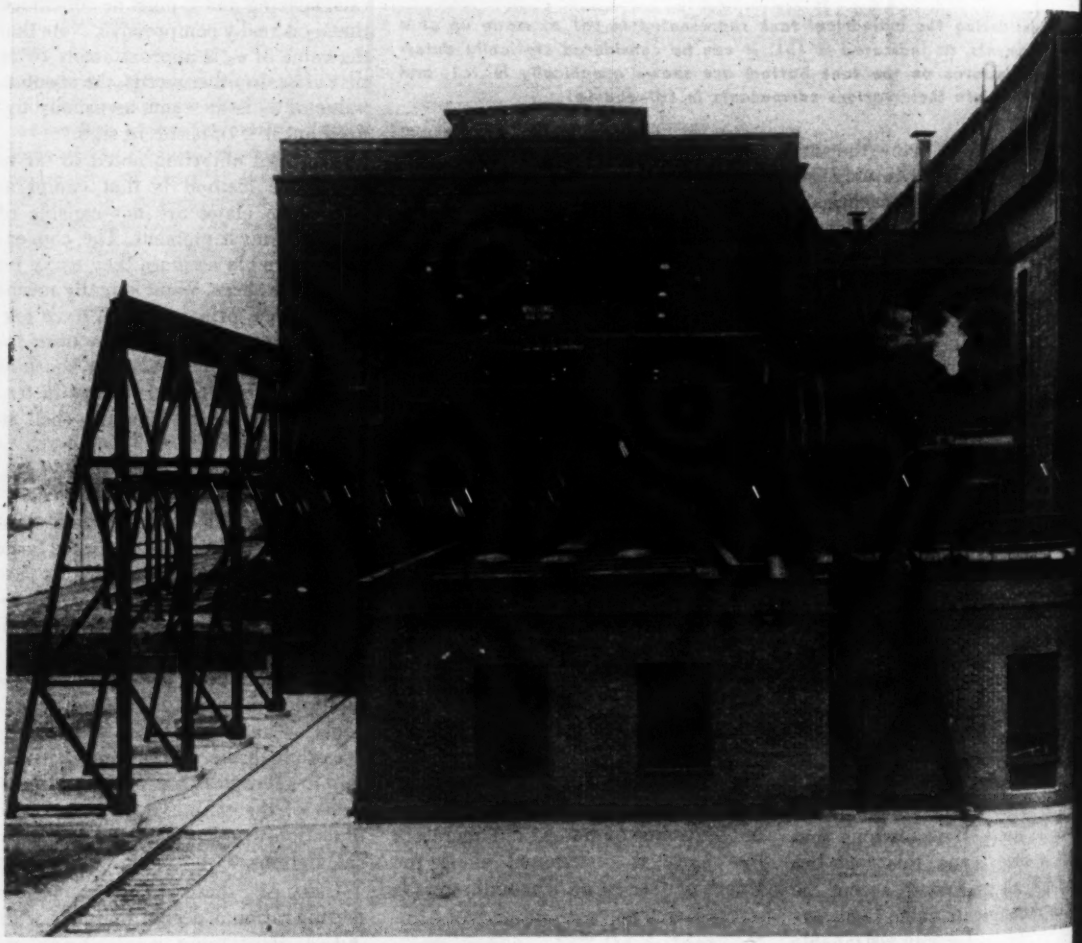
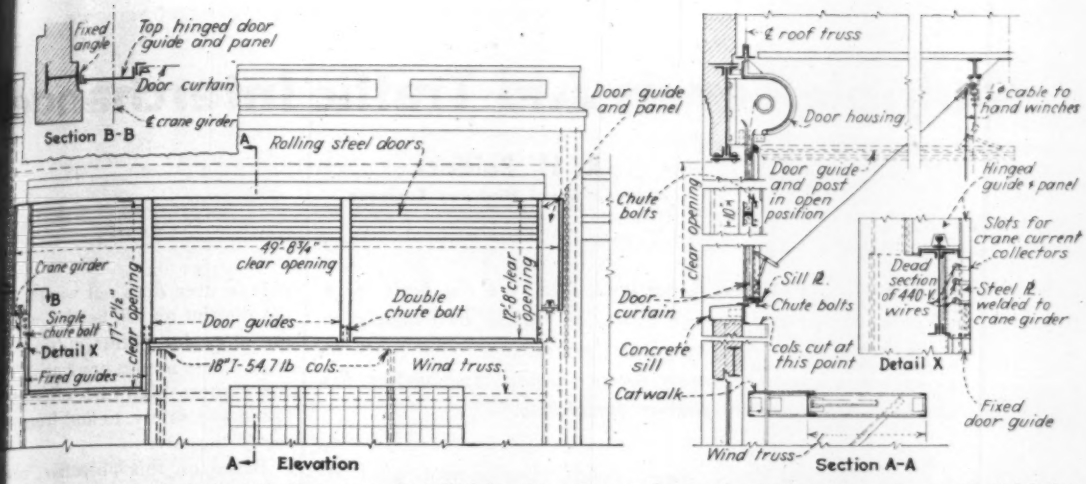


Fig. 1. Use of an overhead crane both inside and outside required a 50-ft. clear opening sufficiently large to pass crane with its control cage at one end and the trolley in any position.



Three hand-operated steel shutters were installed to close the opening, and a horizontal truss was placed below oor sill to carry wind loads and to provide a platform for workmen to secure the bottom of the intermediate posts es the shutters.

rs of equal height are opened losed simultaneously from the ting floor by a single hand chain side of the building. The third is operated by a hand chain other side of the building. As utters will be used infrequently, l operation was considered te. Final arrangement of the s, guide frames and wall fram- hich were designed to withstand b. wind pressure, is shown in

Posts swing clear

r the curtains are raised, the guides are swung up to clear ne by means of ¼-in. steel cable d to chute or lock bolts on the s of the posts. From the attach- to the chute bolts the cable over sheaves mounted on the ide of the roof trusses, hori- y to a sheave at the wall and own to small hand winches at or level. A hand winch is pro- for each post.

n closing the opening, the posts ked in position before the shut- re lowered. To insure that the are firmly fixed before the shut- re lowered, the chute or lock re fastened by hand from a plat- just below the sill line of the rs.

vertical posts, which are of l construction to prevent exces- eflection under wind loads, are ed with wide, close-fitting pin to provide for reasonable align- of the posts at the bottom. To seal the opening above the crane rail and between the outside shutters and the brick end walls, steel side panels were attached to the guides.

Truss carries wind load

Prior to the station extension, the end wall of the old turbine room contained two intermediate columns and a steel-girt framing covered by corrugated iron. Because of the large opening required, necessitating the cutting off of two columns and the reframing of several members, and because this wall would become permanent construction, it was decided to replace the temporary construction with a 12-in. brick wall. This thin wall, which is 50 ft. wide, had to be stiffened against wind.

The old intermediate columns were cut off and reframed at the top to a new horizontal wind truss spanning between crane columns at the level of the shutter sill. It transmits wind loads from the tops of the intermediate columns and the bottoms of the shutter guides to vertical bracing in the plane of the crane columns. This truss also serves as a walkway for access to the curtains and swing posts.

A heavy plate girder lintel was provided over the shutters to support the brick work above. In addition the lintel takes hoizontal wind load and supports the brackets carrying the rolling shutter bearings and post hinges.

An interesting detail arose where the conductors for the crane are carried through the opening (**Detail X**, Fig. 2). A 10-ft. dead section of micarta tubing was inserted in each of the three 440-v. power wires where they pass through the steel closure panel, thus eliminating the possibility of a short-circuit from contact with the panel or with the end posts when they are raised.

Use of this scheme also removed possible danger of shock to a man working on the platform below the shutter sill. In order to supply power to the crane when traveling past this dead section, an additional set of three current collector fingers was fastened to the crane about 10 ft. ahead of the existing collectors.

Crane weatherproofed

The existing indoor-type crane was weatherproofed for outdoor service, the open cage being enclosed with light steel sheets. Sufficient pivoted sash were provided for vision and ventilation. The motors for the main and auxiliary crane hoists were enclosed in individual sheet metal boxes. No attempt was made to weatherproof other portions of the crane or its equipment, except that the drums and hoisting cable were thoroughly greased.

The semi-outdoor installation resulted in a large saving in building volume. This saving can best be appreciated by comparing the low brick extension in Fig. 1 with the elevation of the turbine "hall" in the background. The extension was designed for the Louisiana Power & Light Co. by Ebasco Services, Incorporated, New York City.

Multiple Levels Aid Traffic Interchange

R. H. Baldock
Oregon State Highway Engineer

***Contents in Brief**—Traffic studies at Portland, Ore., are the basis for a comprehensive plan of routing through vehicular traffic, particularly to and from a Willamette River crossing. Transfer from one main route to another makes extensive use of different levels. Present construction fits into a general scheme scheduled for postwar completion.*

SOLUTION of a major vehicular traffic problem in Portland, Ore., reached after long study of traffic flow, follows the general plan of making important interchanges from one main route to another by means of the multiple level method instead of with some version of the "cloverleaf" plan. Portland's problem, like the traffic situation in other large cities, could not be solved by any general rule and had to be examined in the light of its own set of conditions. However, from the outset it was planned to make traffic interchanges by simple moves, using different levels instead of circuitous or looped routes. This has resulted in a comprehensive plan that can be utilized presently only in part. Meantime, such construction as can be done now will all be fitted into a general scheme to be completed as a postwar project.

Because the question of principal thoroughfare development in Portland is closely identified with state highway problems, the state highway commission has headed up the planning for principal routes through the city. Volume traffic counts have been made at intervals and in different seasons for several years. During 1940 a comprehensive origin and destination survey was made. The results were condensed into an analysis of the city's traffic habits and tendencies.

Some 43 percent of vehicular traffic entering and leaving the city was found to have its destination or origin in a comparatively small area of the metropolitan business district. Also, only about 9 percent of the traffic entering the city daily would prefer a bypass; that is, about 91 percent of incoming traffic plans to stop somewhere in the city. On the other hand, 25 percent of the traffic in the metropolitan area does not want to st the district and is headed, prefe non-stop, for points outside th trict. These figures emphasize the for express highways affording speed and safety, to and from the ter of the city.

Based on this objective, plans two arterial highways, the one t east and the other to the west o west side metropolitan district, made. The one to the east, know the Front St. project, was comp late in 1942 as a $3,000,000 thoro fare improvement along the W mette River shore. This develop was financed as follows: right-of- 40 percent by the state and 60 pe by the city; construction, 40 pe by the state, 60 percent by the fe government.

The next step in the building o express freeway is to cross the W mette River to connect with its posed extension to the northern tion of the city. To accomplish th is proposed to build interch ramps to what is known as "the bridge." This is a double-deck s ture whose lower deck carries steam railroad tracks while the u deck serves vehicular traffic. It s of the city's most important cros of the Willamette and, on accou poor connections, has always be effective barrier to vehicular tra

The approaches to this bridge sented a major problem but the s tion of the upper deck made it sible to use a multiple level scheme the solution. The plans adopted getting traffic to and from the br based on long study of various as of the problem, are illustrated in accompanying sketches.

Although full benefit of the se improvements involved cannot realized until completion of the p war construction project, whatev done henceforth will be building ward the ultimate plan on a unit struction basis. When comple traffic should flow with speed

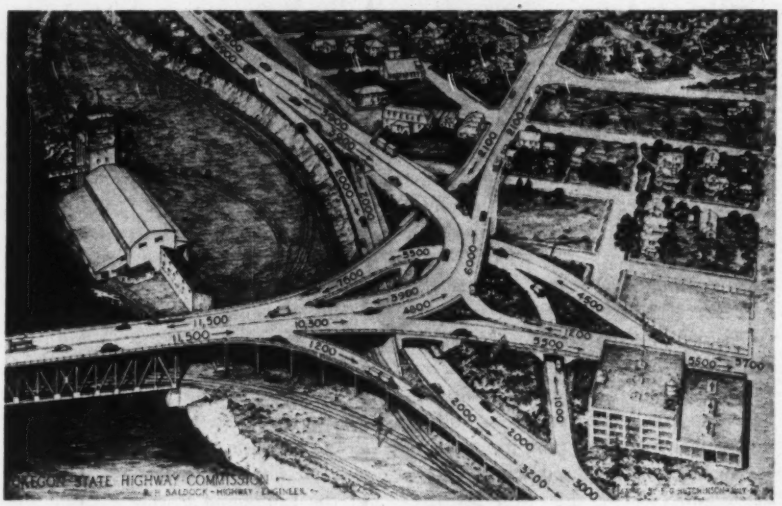


Fig. 1. Interchange arrangement adopted for the east approach to Portland's "steel bridge." Figures show relative traffic volumes.

2. Traffic routing at the west end of the bridge will follow a similar plan. Figures show relative traffic volumes.

ty, free from the delay of traffic als, into and out of the heart of metropolitan district from the outts of the city.

s the sketches indicate, ascending descending ramps make the more venient interchanges available for routes with the greater volume of ic. No left-hand turns are necesand it is believed that there will be no interruption to continuous traffic flows.

The estimated cost of the project, in addition to what has already been done, is $3,250,000 ($500,000 for right-of-way and $2,750,000 for construction). Previous expenditures were $3,000,000 ($2,000,000 for right-of-way and $1,000,000 for construction). Economic studies based on this $6,250,000 estimate show benefits to traffic, measurable on a monetary basis, equal to five times the annual costs if the improvement is written off in 30 years.

Coordination of the various studies made on this project has been the responsibility of the writer as chief engineer, Oregon State Highway Commission.

Progress of Postwar Public Works Planning

t is essential that public works cials obtain more trained person- as well as additional funds for iled planning of postwar public ks. Unless such help can be had, an adequate program of useful needed improvements for conction during the period of transi- from war to peace will be deed. This was indicated by a survey 68 cities on the progress of adce plan preparation and engineer- design conducted recently by the erican Public Works Association. e of reporting cities ranges from endale, Wis., with a population of 00 to San Francisco with a 674,000 ulation.

According to the survey, for every 000,000 of municipal public works dy for the contractor, $3,000,000 nder survey and $9,000,000 being en preliminary study.

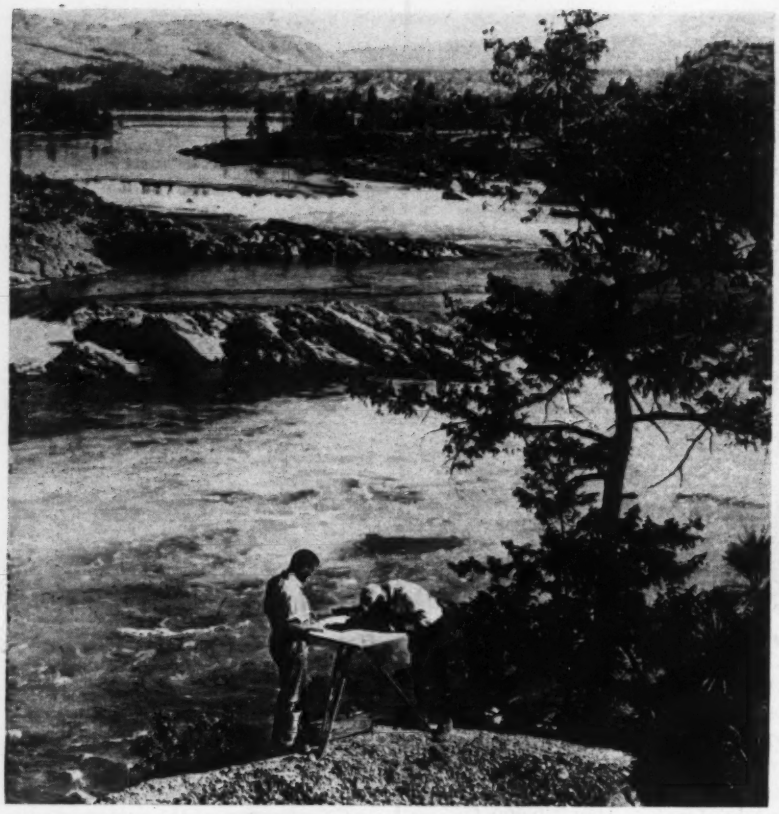
Results of the survey show that contracts could have been let for capital improvements amounting to $48,-124,371—$8,000 of construction per 1,000 population—on Jan. 1, 1944, by the 68 cities reporting. Surveys and plans had been instituted for capital improvements valued at $139,-430,608, or $23,100 per 1,000 population. Preliminary studies of a general nature were started on projects totaling $437,530,102, approximately $72,500 per 1,000 of population.

Among reasons for the lag between completely planned improvements and needed public works on which only preliminary studies are underway is the shortage of trained engineering personnel in the public works departments. Seventy-five percent of the cities reporting indicated additional personnel was necessary for development of adequate programs: 76.5 percent required more funds.

At least 67 percent of the cities, most of them in the larger population group, believe federal assistance would further local advance plan preparation. Given sufficient funds and adequate staffs, all 68 cities indicated capital improvements valued at $173,-000,000, or $28,600 per 1,000 population, would be designed this year.

Deferred maintenance projects amounting to approximately $19,-733,975 have accumulated in the reporting cities—a ratio of $3,270 per 1,000 population.

A rough estimate of advance plan preparation by all cities under 1,000,-000 population shows capital improvements valued at $550,000,000 were ready for contract, $1,600,000,000 were being surveyed and $3,780,000,-000 of public improvements under preliminary study by Jan. 1.



The peculiar advantages of a pl table are most apparent in mapp rough country. Irregular detail can put on the map in the field with facility and in detail not possible wi taking topography by transit.

Plane Table Versus Transit For Topographic Mapping

M. F. Denault
Engineer, W. N. Brown Inc., Washington, D. C.

***Contents in Brief**—Large savings in cost are possible by greater use of the plane table for topographic mapping. Increased accuracy on many problems also results. More "shots" may be taken in a given period with a transit, but fewer readings are required when using the plane table, which actually results in more rapid work by the latter method.*

SINCE ENGINEERS are characterized by their broadmindedness concerning new developments in their own particular field, it is difficult to understand the profound prejudice against the use of the plane table for its primary function of making topographic maps.

This prejudice exists among a large percentage of engineers engaged in various surveying capacities and is not confined to any particular group. It exists in small local survey outfits, the public utility group, state and municipal survey organizations and the larger, older and better organized surveying companies. To those who use and advocate the plane table method, topographic mapping done by transit seems ridiculous. But there are two sides to the question and both should be evaluated.

First consider the reasons att uted to this prejudice. With smaller groups the cause is mostly norance of the existence, stra though it may seem, of the alid and the plane table or, if known, their function. Naturally this co tion is not found among the lar surveying companies, instead a de nite reluctance to depart from the method of doing topographic ma ping by means of the transit is vealed. And what is more, no desire shown to give the plane table an portunity to prove itself.

It is only fair to mention that pu lic utility groups are generally m progressive, but, as is the case w most public function groups, incli to observe old methods and to quire more detail than seems nec sary. This attitude eliminates the pla table as a valuable instrument certain tasks, as its very simplic does not conform to the methods pre alent and long established. But t purpose of the topographic m should be understood in order properly evaluate the conditions u der which it can best be made.

Purpose of topographic maps

Speaking generally, the purpose such a map is to act as a guide chart upon which culture, detail, a topography is shown, enabling a curate planning of highways, ra roads, sewer and water systems, a port and dam construction, geolog exploration, forestry and modern wa fare. Therefore, topographic maps a used primarily for planning and est mating. The technical or instrume tal accuracy should be commensu ate with the needs of the map, as ea use requires its own degree of a curacy and detail.

The three transit methods in cu rent use for topographic mapping ar

(1) A convenient base line is la out and at constant intervals, depen ing upon the desired scale and contou interval, lines at right angles to th base line are projected. Along the

s stakes are set at the desired in-
als and the ground elevation at
e points determined, intermediate
ations being taken at changes of
e. When the lines are drawn and
data plotted on the map sheet in
office, the contours may be inter-
ated.

(2) Random transit lines are run
ough the area to be mapped, the
itions computed, then plotted on
map sheet. From these positions
supplementary ones, an azimuth,
stadia distance and elevation of
red points are determined. These
are recorded in a field book,
ch is taken to the office, where the
are plotted on the map sheet by
topographic draftsman. All con-
rs, culture, and detail are sketched
the office.

(3) The Baltimore or Shirley
thod, which was first employed on
ity of Baltimore survey in 1894-
5. This method, used mostly in the
timore region, differs from the
ond procedure only in the fact
the draftsman accompanies the
rey party, plotting and sketching
he field as the work progresses.

The Baltimore method more nearly
proaches plane table work, but is
in general use. The first method,
gh used widely, offers the least
antage of the three methods, due
he great amount of work required
lining and setting stakes and the
y cutting necessary in wooded
ntry. Therefore, for the purposes
his discussion, the second method,
ch is that most commonly used,
be the one considered to compete
plane table work.

Plane table for triangulation

The plane table and alidade were
developed as a means of doing
phic triangulation, for which they
unsurpassed. Success in this work
to their eventual use in the mak-
of topographic maps, using for
ntation the methods developed for
ngulation.

Methods of orienting the plane table
as follows: (1) The foresight and
ksight method, the strongest and
one used where a compass is of
value due to magnetic attraction;
the resection method; (3) the
e-point triangulation method; (4)
Baldwin solar chart designed for
where the compass is of no value;
(5) the much-used compass
dle orientation.

These methods have all been adapted for use on small and medium scales. On large scales, the foresight and backsight, the resection and the compass needle methods are most satisfactory. These methods of orientation give many advantages not possessed by the transit. For example, the three-point method would be impossible without the complicated three-point computations.

The modern telescopic alidade, which has internal focusing action, accurate cross hairs and a powerful lens, is a precision instrument designed and manufactured especially for use in making reconnaissance and topographic surveys with the plane table. Since all horizontal distances are measured by stadia, the alidade has been designed with this factor in mind.

Results in the field prove the importance of this consideration, as the abilities of the alidade have reached a high point. One of its greatest assets is the Beaman arc, which breaks down the trigonometric equation of solving for the vertical correction into a few simple arithmetic steps, and eliminates reading vertical angles and the use of a correction slide rule. Furthermore, the alidade is light, easily carried in the crook of one arm, extremely durable and quickly adjusted.

Some engineers contend that the plane table is not as accurate in determining the "turns" or supplementary control positions as is the transit, due to the fact that with the transit an accurate angle is determined from one turn to the other, thus enabling a better determination of position, as against the plane table where position is determined graphically. The only other factor of note against the use of the plane table is that the field notes are worthless for reference once the topography is done, and that the positions cannot be checked by another worker. This reason involves several factors that shall be explained in their turn. Finally, there is also the claim that the transit is faster, since more "shots" can be taken in a given time. This view also demands an explanation.

Comparison of two methods

Let us break down the mechanical or technical operation of both methods, comparing one against the other and bringing into the discussion the factors noted above: First, the question of determining the supplementary control. While an angle "doubled" to a point is more accurate *in itself* than an alidade sight drawn on the sheet, it is another matter to transmit that accuracy *to* the map sheet.

In the transit method, a 360-deg.

More "shots" can be taken in a given period with a transit than with the plane table, but fewer readings are required when using the latter method.

protractor is fastened securely to the sheet with its center corresponding to the transit traverse station at which the transit was set up, and with its north-south axis parallel to that of the grid laid out upon the map sheet. By means of a scale, reading left and right from the center, and pivoted upon the plotted position of the traverse station, the azimuth, as taken from the field book, is plotted by means of the protractor and a line drawn. Then the stadia distance is plotted along that line.

Crux of this work lies in the accuracy of transmitting the transit angle reading to the map sheet. Great care must be used in placing the protractor in the correct position, and unless securely placed, it is liable to slippage and consequent error. The protractor in most common use is only calibrated to 15 min., which means that the topographer or draftsman can interpolate to the nearest 5 min. at best.

With the plane table, the map sheet is attached to the table. On the sheet are the plotted positions of the transit traverse stations. The original orientation is determined by setting up over a traverse station, placing the straightedge base of the alidade, which is parallel to the telescope's line of sight, on the plotted position of the station at which the table is set up and on that at which the backsight is planned. This work establishes a graphic line of sight relative to that of the two stations on the ground. The table is pivoted until the vertical crosshair of the alidade bisects the rod on the backsight traverse station, then locked in position. This work puts the map sheet in orientation the same as a transit would be after backsighting on the traverse station and locking the bottom plate.

This operation with the plane table accomplishes in several easy steps, the same results obtained in setting up and orienting the transit and going through the necessarily detailed motions of properly securing the protractor in position on the map sheet. Furthermore, the worker using the plane table has the added advantage of being able to backsight on any visible station plotted on its sheet. The longer the sight the stronger the orientation, which holds true in using the transit. The stadia distance is read to the point desired, and the base of the alidade is brought to the plotted position of the control point and pivoted about this point until the rod is bisected by the vertical crosshair of the telescope. Finally, the line of sight is drawn along the alidade straightedge and the stadia distance plotted along this line. Thus, this method has the accuracy obtained by the transit without the loss of accuracy in its transmission to the map sheet with the protractor. This fact should be considered an important difference.

Advantages of transit questioned

The claim that plane table notes are worthless for checking, because of their lack of recorded direction, can be offset against the fact that the azimuth reading to "shots" is not "doubled." Any error resulting from an incorrect azimuth or line of sight can only be corrected in the field by physical comparison of the feature against the graphic position on the map sheet. The plane table topographer readily notices such an error. This statement also applies to vertical distances. By the plane table method evaluation of horizontal angles is unnecessary, as the rod or object is sighted through the telescope and directly aligned in the field.

Another claimed advantage for field notes obtained by the transit is that the topography may be plotted on different scales in the office. The worth of this claim is questionable, however, as the map scale of an area to be mapped is the most important factor to be decided and should be carefully selected before the field work is started. The number of field shots to be taken should have a direct ratio to the map scale, making it unlikely that the notes should ever be used to produce a map plotted on a larger scale. Should the reproduction of a map at a different scale be desired when the plane table method is used, it may be done by photography or if the area is small, by a graphic method.

Transit speed no advantage

Concerning speed, it is true that more shots may be observed with a transit in a given time, as the transitman reads only the shots in the field, while the topographer reads and plots the shots and sketches the topography. The fact that many more shots are taken does not signify that any great amount of work is accomplished, since in using the transit almost twice as many shots must be observed.

This fact is true because the draftsman in the office has never seen the area to be mapped, and the additional shots are necessary to insure that the detail may be correctly sketched—detail that is seen and sketched in the field by the plane table topographer. Thus, the small number of shots required with the plane table method offsets the greater number observed in a given time with the transit. In addition, no man can achieve from field notes the correct expression of the contours of an area he has never seen.

During January, February and March of 1942 in the Norfolk and Portsmouth areas of Virginia several groups were engaged in making topographic maps of six federal housing projects. The nature of the topography in all areas was very similar. One group, using the plane table and alidade, performed its work at a unit cost of $4.50 per acre. This included necessary horizontal and vertical control and the delivery of pencil copy of the map sheet.

The unit price of the other groups under the same conditions, ranged from $15 to $30 per acre. The transit method used by them was the final method as described in this article. Through time saved and the need of less men, the plane table achieved this economy. Other instances of a like comparison are known although figures are not immediately available.

Further proof of the value of the plane table is illustrated by the work now carried out by this method. The U. S. Geological Survey has for a good many years considered the plane table a basic necessity for producing the standard quadrangle maps of the United States, in fact, uses the plane table exclusively, except for those areas now mapped by stereoscopic methods. The Corps of Engineers, U. S. Army, recognizes the worth of the plane table as shown by its use in the training of the Topographic Battalion of the Corps. Also, the major oil companies use the plane table to make reconnaissance topographic maps for oil exploration and geologic study. With the U. S. Coast and Geodetic Survey it is a standard piece of equipment. This wide use should be tangible proof that the plane table exceeds the transit for topographic mapping.

To summarize, the keynote of the plane table method is flexibility, simplicity and adaptation to the condi-

ns encountered. The plane table been pictured as being a bulky, mbersome outfit, requiring many ds in its use. It cannot be too ongly emphasized that this impres- n is erroneous, as the modern plane le with its light efficient Johnson tripod head and the compact telescopic alidade is easily carried by one man, and just as easily maneuvered through brush. In addition, the greatest advantage of the plane table is that it makes it possible to prepare accurate topographic maps on medium and small scales with a minimum of time, control, and cost. Using large scales, the element of control is the only one to differ, as it needs an amount almost equal to that of the transit method, while keeping the advantage of the factors of time and cost.

Evaporating Ponds for Waste Water Spread Over 1,800 Acres

LARGE INDUSTRIAL PLANT in a re- te, arid area of the West, when erating at full capacity, will pro- ce a continuous flow of about 3 g.d. of waste water highly charged h sodium chloride and other chem- ls. To avoid polluting sources of ter supply, the means selected for posal of this waste was to dis- rge it into shallow ponds, formed making dikes, where evaporation d percolation would leave the salts or near the surface. Quantities of w and desirable periods of reten- n in the individual ponds governed facilities required and resulted in ing out a 1,800-acre area with es constructed along contour lines. Outer dimensions of the tract of d used in this disposal area are ghly 10,000x7,000 ft. To protect ponded areas from storm waters itch was constructed around the per edge of this area 20 ft. in dth and ranging from 4 to 10 ft. in pth. There are 338 of the indi- dual evaporating ponds. In con- uction of the dikes and the central nnel for delivering waste water to m, some 1,500,000 cu.yd. of earth d to be scraped up, spread in place d compacted.

Waste water from the plant is de- ered to this area in a 24-in. pipe discharging into the upper end the central canal from which the ter is distributed in both directions o the rows of evaporating ponds. Simple concrete weirs are used to ert flow from the main channel o the desired inlet channel whence water has access to a series or row the evaporating ponds laid out ng a contour line. When the first nd is full water flows around the hill end of the spur dike into the t succeeding pond and this con- ues until the entire row of ponds this contour is filled. At the proper e to allow for water in transit to reach the end of the row, an attendant closes one inlet weir and opens another, transferring the flow to the next succeeding row.

Although the dikes vary somewhat in size, the intent was to have them about 5 ft. high and to make the center line of each main dike follow a contour. Thus spur dikes could be built at right angles to the main dikes, maintaining the same top level but not extended upgrade beyond a ground level some 18 in. below the crest of the main dike. This arrangement provided ample depth of channel for flow from one pond to the next, around the upper end of the spur dikes, without endangering the dikes themselves.

At first the plan was to build the dikes with a top width of 1 ft. This was changed to a 10-ft. top width with a 3:1 slope on the pond side and a 1:1 slope on the downhill face. With the wider dike, carryall scrapers could be used to build up the dikes and it was considered unnecessary to use tampers or rollers for compaction—with this dike section sufficient compaction was provided by the tractors and the heavy carrying scrapers.

Satisfactory moisture content, in the main, was obtained by applying the water before the earth was taken up by the scrapers. Occasionally this was supplemented by watering the dike directly.

The spur dikes were roughly laid up by scraper blades, attached to tractors, and were shoved up into finished form by small bulldozers. The downhill face of the main dikes were finished with a dragline which the operator hauled forward or permitted to drag backward according to variation in direction, slope and location.

When the dikes were located and stakes were set, the problem was to balance the length and width of the ponds with the volume of material needed for the dikes that would fit the ground surface slope at each location.

Pond lengths ranged from 400 to 750 ft. and the widths varied with the surface slope; typical dimensions are about 175x550 ft.

The central distribution channel, about 2 mi. long, and the 20-ft. diversion channel for storm waters were dug with a dragline using a 2½-cu.yd. bucket.

Construction of the evaporating ponds was carried out by the McNeil Construction Co., Los Angeles.

Aerial view of part of the 338 evaporating ponds. Spur dikes separate the ponds and facilitate the spread of the flow into a thin sheet over the pond area.

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTOR

Improved Warning Signs Are Possible at Little Cost

Painted highway signs are often difficult to read. No matter how large the sign it can only be read when the motorist is about to run over it and that may be too late. In some locations large signs have been made using a considerable amount of paint, but are not legible at a distance due to the fact that the letters were made with parallel sides. If the letters diverged they would appear parallel to the eye and would be legible.

An accompanying sketch shows a sign devised and installed by the writer on a street in the Village of Mariemont, Ohio, and which has been found very effective. Luminous paint was used, and the sign can be read at night at 300 ft., although it was designed to be seen at a distance of 50 ft.

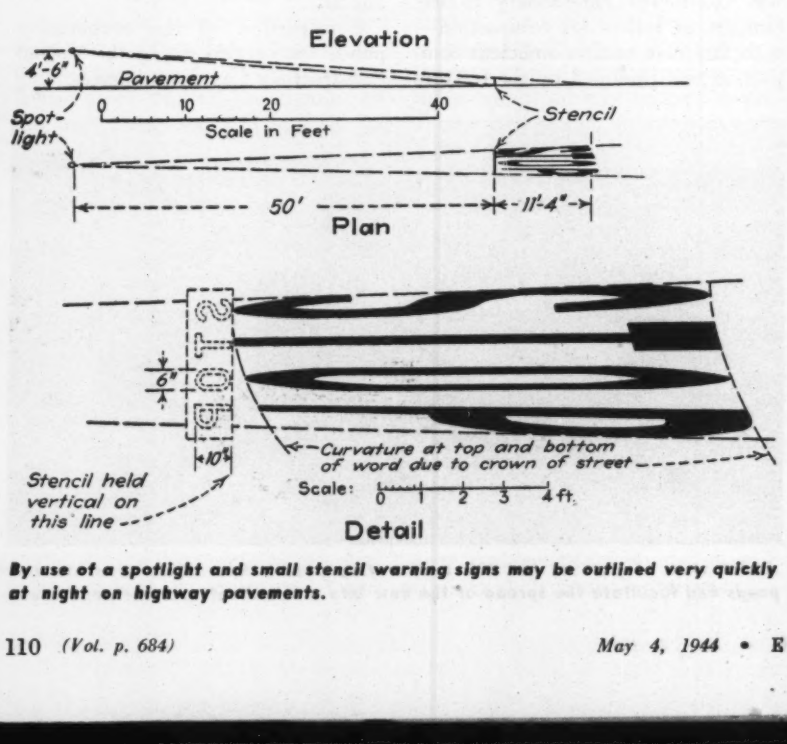
The only equipment needed to lay out a sign is a stencil and an automobile spotlight. The spotlight is attached to an auto or truck approximately 4 ft. 6 in. above the pavement, that is at the level of the motorist's eye, and then the car placed so that the distance of the spotlight from the curb line will correspond with the distance the auto driver's seat is away from the curb.

The sign was installed on a residential street on which there is no high-speed driving, 50 ft. being selected as the approximate range of the lower or "city" headlight beam of the average auto. On main highways it would be advisable to locate the spotlight farther from the stencil, thus making the sign legible at a greater distance. However, the same stencil can be used for any distance as letters 10 in. high are visible for several hundred feet.

Although the stencil used here was of cardboard, it could be made of any scrap metal. They should have a base so that they could be leveled and kept erect while the sign is being outlined. The sign made was outlined in crayon and painted the following day, but it could easily be painted at night, the painter merely following the edge of the shadow. A return trip to the site would not be necessary.

The spotlight method automatically compensates for irregularities in the pavement, such as the crown or changes in grade. The single source of light at the height of the eye produces the correct divergence, as well as the unequal line widths and to the motorist it is as effective as a vertical sign with letters 10 in. high. Although the letters of the sign will appear vertical at only one location, the sign can easily be read both before and after passing that spot. Due to the 6-in width of the letters, it is possible to have more than one word in an ordinary traffic lane thus doing away with the vertical sentences so often confusing to the motorist.

In addition to the words such as STOP, SLOW and RAILROAD it is possible to use standardized pictures or symbols for many of the highway hazards. A picture of a small child on the pavement would no doubt create greater psychological effect than just the word SCHOOL.—C. P. Ludwig, *6617 Murray Ave., Cincinnati 27, Ohio.*



By use of a spotlight and small stencil warning signs may be outlined very quickly at night on highway pavements.

Field and Office Comment

Short Cut Methods Questioned

Sir: I have read with considerable interest the recent articles on methods of extracting roots, printed in *Engineering News-Record*, Jan. 13, being the date of the most recent article. In my humble opinion, these suggested short cuts or easy methods have added to, rather than subtracted from, so-called difficulty in extracting square and cube roots.

No one appreciates the value of time-saving mathematical formulae and equations any more than I do, but there are a few of us not blessed with memories of exceptional capacities for long, complicated, and comparatively abstract formulae and equations. Extracting square roots is almost a daily privilege in my work, and problems involving cube roots arise several times a year. I am sure that absence of difficulties is due to the methods used and primarily the way they were taught.

In this connection as well as on other jobs, I have always found that an individual who has trouble with

xtracting square root and cube root, ually has tried to memorize a for- ula without having been taught the asons for each step. Any mathemat- al-minded individuals interested in e logic of tangible reasoning cannot rget how to extract square and cube ots, once they have been taught, ith simple drawings or with wood ocks, the basic reasons for the few mple steps.

If due to infrequent use of the old, nghand method, the routine method forgotten, it always can be re- embered by making the simple draw- gs of a square or a cube. If, by ance, any of your readers have for- otten these drawings and do not now where to find them, I shall be lad to prepare them for you.

As far as I know, these basic meth- ds are explained and illustrated in y junior or senior high school athematical textbook. With only a ttle practice it is just as easy to ex- act the square root as it is to do a roblem in long division, and about e only reason for the opinion that ube root extraction is an insurmount- ble difficulty is that we do not find e for it so frequently.

By way of contribution, may I offer e following short cut for the squar- g of small numbers ending with the igit 5 or fraction $\frac{1}{2}$?

Multiply the number preceding the or $\frac{1}{2}$ by the next higher number and ttach to this product the two digits 5, or the fraction $\frac{1}{4}$.

Examples

$2\frac{1}{2}\times 2\frac{1}{2}=(2\times 3)+\frac{1}{4}$ or $6\frac{1}{4}$.

$11\frac{1}{2}\times 11\frac{1}{2}=(11\times 12)+\frac{1}{4}$ or $132\frac{1}{4}$.

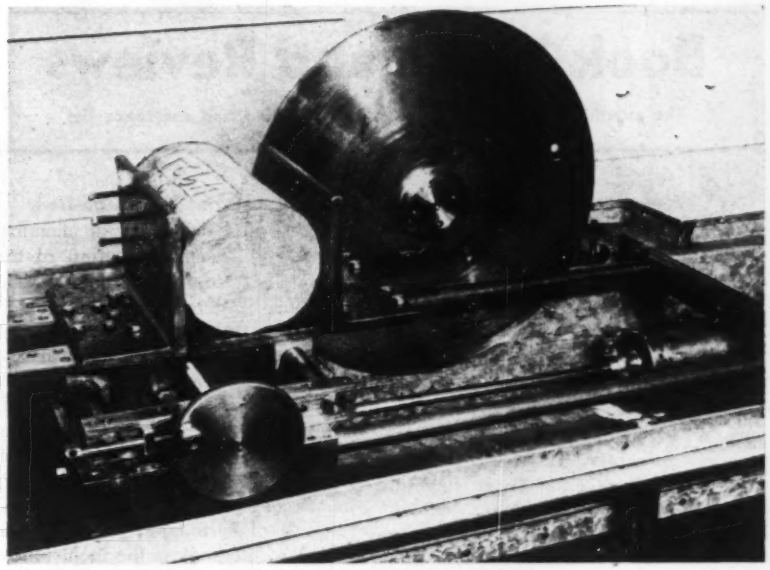
$85\times 85=(8\times 9)+25$ (attached) or 7225.

$.055\times 0.055=(.05\times .06)+25$ (attached) or .003025.—H. G. TAYLOR, *Diamond Chain and Mfg. Co., Indianapolis, Ind.*

---

mproved Saw for Cutting Concrete and Rock Specimens

A highly satisfactory small diamond w designed for the preparation of in-sections of small pieces of rocks nd concrete for petrographic studies as been built by the California High- ays and Public Works Department. he machine, which is shown by an ccompanying photograph, also may e used to saw large pieces of concrete labs, cores, and cylinders.



Concrete and rock may be cut in very thin sections by the above diamond saw.

The sawing element consists of a 20-in. dia., diamond-studded, 14-gage steel disc mounted on a ball bearing spindle, with a pulley on the other end belted to a $\frac{1}{3}$-hp. electric motor. The speed of the cutting edge is 2,200 ft. per min. It dips approximately 1 in. into a mixture of 50 percent SAE No. 20 oil and 50 percent kerosene.

In making the saw, its edge was first rolled to a width of $\frac{1}{10}$ in. and to a depth of $\frac{3}{64}$ in.; after which each $\frac{1}{4}$ in. of the circumference was cross-cut to a width of 0.028 in. and a depth of $\frac{1}{32}$ in. Next No. 60 mesh diamond chips were placed in the cross-cut slots, which were then lightly peened. After completing the diamond setting, the disc was re-rolled to force the metal firmly around the diamonds, but still maintaining the $\frac{1}{10}$-in. width.

The saw was then mounted on the arbor of the machine, and with a medium grade carborundum block in the specimen holder, the machine was operated with a light pressure to wear off the surplus metal, thereby exposing the diamonds in the cutting edge and making the saw ready for use.

The specimen holder consists of an adjustable vise with the jaws drilled and tapped for set screws on approximately 1-in. centers both ways over the entire face. One jaw is stationary and the other adjustable over a 12-in. range. The holder is mounted on a carriage sliding on round rods and traveling at right angles to the axis of the saw arbor. This movement forward and back is obtained by water pressure in either end of a brass cylinder, one end being anchored to the frame of the machine, with the piston rod attached to the carriage. A cross adjustment is provided to regulate thickness of slices cut.

Water to operate the carriage is obtained from the city mains at a pressure seldom exceeding 40 psi. Reduced pressure, usually 1 to 5 lb., is used during the sawing operation, the pressure being reduced by a specially designed rotary type valve in which both full and reduced pressures are controlled simultaneously. The water cylinder was made from a $2\frac{1}{2}$-in. standard brass pipe having ordinary $2\frac{1}{2}$-in. pump leathers. The piston rod is $\frac{5}{8}$-in. dia. round bronze, with a maximum travel of 23 in. Gauges show both main line and reduced water pressures.

Operation experience to date indicates: (1) Slices as thin as $\frac{1}{32}$ in. may be prepared without difficulty, (2) cuts on all materials may be smooth enough to polish without preliminary lapping, (3) the feed control is responsive to the will of the operator, and (4) the saw is expected to have a long life.

The saw was designed and built under supervision of the writers—ALLEN NICOL and GEORGE POMEROY, *Mineral Technologist and Instrument Maker, respectively, Materials and Research Department, California Division of Highways.*

Book Notes and Reviews

The month's addition to the engineer's reading and reference list

Waterworks Manual

MANUAL FOR WATER WORKS OPERATORS—prepared by Texas Water Works Short School. Available from the Short School Office c/o State Health Department, Austin, Tex., Price $3.

Several new features and more than 100 pages of additional text lend greater usefulness to a revised edition of the excellent manual for waterworks operators prepared by the Texas Water Works Short School. There is probably no other text in the field more up-to-date and more complete in its coverage than this manual, which represents the contributions of 23 authors.

In concise form this book presents the information needed to intelligently undertstand the functions of water supply operation and maintenance. Among the new features will be found a reprint of the recently revised U. S. Public Health Service standards and recommended practices, additional data on measuring water flows and servicing of meters, developments in chlorination and control of alga conditions.

Sanitary "Lab." Manual

LABORATORY MANUAL FOR CHEMICAL AND BACTERIOLOGICAL ANALYSIS OF WATER AND SEWAGE—Third edition. By F. R. Theroux, E. F. Eldridge and W. Leroy Mallmann. 274 pp. McGraw-Hill Book Co., New York, $3.

Streamlining the abstracting of current literature, a feature which has made earlier editions of this laboratory manual popular with plant operators, engineers and chemists alike, has improved this edition over previous ones. Another improvement is inclusion of additional material dealing with chemical analyses of water and sewage, analyses of industrial wastes and chemicals used in the treatment of water and sewage.

The general method of presenting analytical procedure, reagents employed and theory behind the analytical methods in separate sections of the book has again been followed. Grouping of the texts with reference to their application facilitates finding whatever information is desired.

The section dealing with chemical analyses is good in selection of the methods best adaptable under certain conditions and in the designation of reasonable ranges of accuracy for colorimetric methods. Some of the more complex methods, however, are rather sketchily described and difficulties commonly met with, which require special treatment, are ignored.

Bacteriological procedures are adequately described and easy to follow. The only objectionable feature of this section of the book is the inclusion of several procedures for a single type of test. This may prove confusing to those for whom the book was professed to be written, namely water and sewage plant operators.

In reality, this book is of dual character. In some respects it is admirably adapted to the use of plant operators and in others goes beyond their usual scope.

In general, this book can be recommended as the best available.—*Reviewed by* HARRY W. GEHM, *Associate Chemist, Dept. of Water & Sewage Research, N. J. Agricultural Exp. Sta., New Brunswick, N. J.*

New Engineering Books

MATHEMATICAL TABLES: Table of the Bessel Functions $J_0(z)$ and $J_1(z)$ for Complex Arguments ($5); Table of Reciprocals of the Integers from 100,000 through 200,009 ($4); Table of Circular and Hyperbolic Tangents and Cotangents for Radian Arguments ($5). Columbia University Press, New York 27, N. Y.

MARINE COPPERSMITHING—By Frank J. Carr. 189 pp. McGraw-Hill Book Co., Inc., New York and London. $2.

HYDRAULIC TABLES—Second Edition. 565 pp. War Department, Corps of Engineers. Superintendent of Documents, Washington, D. C. $1. *A book containing 46 hydraulic tables applicable to solution of problems of flow in open channels.*

RAHMENFORMELN—By A. Kleinlogel. 60 pp. Published originally by Wilhelm Ernest & Sohn, Berlin in 1939. Published in this country by Frederick Ungar Publishing Co., New York, under authority of the Alien Property Custodian. $7.50.

CALCULUS REFRESHER FOR TECHNICAL M —By A. A. Klaf. 431 pp. McGraw-H Book Co., New York and London. $3.

UNIFORM BUILDING CODE—1943 Edit 322 pp. R. C. Colling and Associa Los Angeles. $2.

INTERNAL COMBUSTION ENGINES—By gess H. Jennings and Edward F. O 471 pp. International Textbook C Scranton, Pa. $4.50.

THE THEORY OF THE GYROSCOPIC COM AND ITS DEVIATIONS—By A. L. Rawl 182 pp. The Macmillan Co., New Y $3.

TECHNOLOGY AND LIVELIHOOD—By Mar Fledderus and Mary van Kleeck. 237 Russell Sage Foundation, New Y $1.25.

20TH CENTURY ENGINEERING—By C. H. Tupholme. 201 pp. Philosophical Libr New York. $3. *A British book rela chiefly to mechanical, electrical, chem and marine engineering.*

AMERICAN HOUSING: PROBLEMS AND P PECTS—By Miles L. Colean and the H ing Committee. 466 pp. Twentieth C tury Fund, 330 W. 42nd St., New Y 18. $3.

HEATING VENTILATING AIRCONDITIONI GUIDE, 1944—1,168 pp. American Soci of Heating and Ventilating Engine New York. $5.

Reports and Pamphlets

DIRECTORY OF THE AMERICAN COUNCIL COMMERCIAL LABORATORIES—A guide the leading independent, testing, resea and inspection laboratories of Ameri A. J. Nydick, 63 Wall St., New York

MODERN DEVELOPMENTS IN REINFO CONCRETE, No. 9—Portland Cement A sociation, Chicago 10, Ill.

THICKNESS OF FLEXIBLE PAVEMENTS HIGHWAY LOADS—Wartime Road Pr lems No. 8. Highway Research Boa Washington 25, D. C.

BUILDING CONSTRUCTION COST DATA, —By R. S. Means, Box 146, Jack Heights, L. I., N. Y. $1.60.

THE ROLE OF THE FEDERAL GOVERNMENT HIGHWAY DEVELOPMENT, An Analysis Needs and Proposals for Postwar Acti Senate Committee Print, Superintend of Documents, Washington, D. C.

BLUEPRINT FOR POSTWAR ROADS AND JO American Road Builders' Associati Washington 4, D. C.

QUANTITY OF WOOD TREATED AND PRESER TIVES USED IN THE UNITED STATES 1942—By R. K. Helphenstine, Jr., For Service, U. S. Department of Agricultu and the American Wood-Preserves As Chicago, Ill.

(*Continued on page* 136)

What Does a Good Highway Cost?

That depends entirely on how it is designed and built.

If it is designed for road-mix and a Wood Roadmixer, it can be built for one-third the cost of any other method of pavement construction. It will be a top-quality, long-life highway, low in first cost and low in maintenance cost.

The Wood Roadmixer is a complete traveling mixing plant. It uses local or native materials proportioned and mixed *on the job*. It produces more than 2,000 tons of mix per 8-hour day in *one pass* with a two-man crew, and handles either emulsion, road-oil or soil cement mixes.

The Wood Roadmixer is the world's most versatile road-building equipment. As such, it gives free rein to the use of common sense in the design, preparation and finish of a job. That's why today Wood Roadmixers are building pavement faster, better and at less cost. And that's why they will be in even greater demand for peacetime pavement construction.

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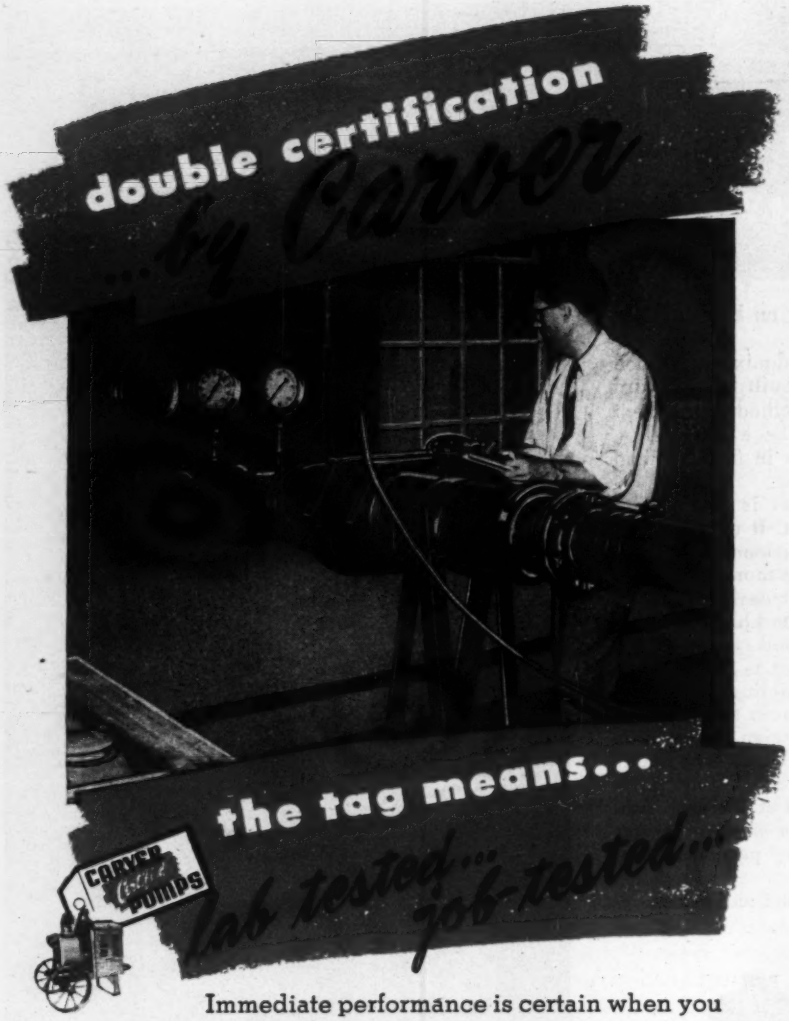

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Longtime performance is sure when you put a Carver *Certified* Pump on those tough jobs. Our on-the-job tests have made sure of that—proved that Carver's simplified design with fewer and sturdier wearing parts will pump more, stand more abuse, last longer.

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CARVER CENTRIFUGAL Certified PUMPS

NEWS OF THE WEEK

(*Continued from page 75*)

Road surfacing planned for Indiana highways

Bids have been received by the diana State Highway Commission bituminous road surface treat projects, covering 480 mi. of state h ways, according to S. C. Hadden, ch man of the commission. The roads in Benton, White, Clinton, N DeKalb, Allen, Whitley Adams, W Union, Randolph Ripley, Dear Switzerland, Sullivan, Spencer, W rick, Knox, Daviess, Martin, Pike, bois, Morgan, Hendricks, Clay, Wab Miami, Fulton, Whitley, Kosciu Huntington, Starke, Marshall, Por Cass, Fulton, Carroll, Brown, B tholomew, Decatur, Harrison, Clark Scott counties.

The commission recently awar $4,000,000 worth of bituminous re facing contracts for maintenance improvement work.

. . .

Markwell and Vickers new Reclamation posts

Kenneth Markwell, formerly gional director of the Federal W Agency, with headquarters in Richmond, Va., has been appointed assistant commissioner of the Bureau of Reclamation in the Department of Interior, assuming his new duties April 17.

Kenneth Markw

Mr. Markwell had been in charge of the FWA gional office in Richmond, since Aug 1942, directing a program of war p lic works estimated to cost $75,000, in Virginia, West Virginia, N Carolina, Delaware, Maryland and District of Columbia.

A native of Oklahoma City, Ok Mr. Markwell attended the Univer of Arkansas and the University of Ok homa, where he received a B. S. deg in civil engineering in 1920. During first world war he served with the M ine Flying Corps.

After his graduation from the Univ sity of Oklahoma, Mr. Markwell took position as chief draftsman in the c engineer's office at Memphis, Tenn. 1926 he organized the firm of Kenn

Supercharger 1690 MODEL

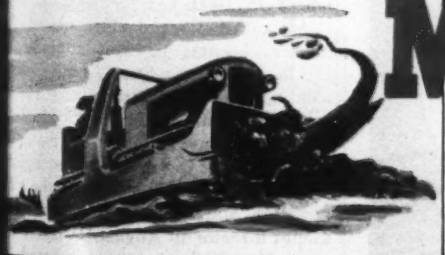
…and bellows used by the early settlers and still …g beside many fireplaces is the grandfather of …'s Supercharger. Down through the line of descent …lows, blower, supercharger—the function has been …ce denser air into the combustion zone. In the …ace "supercharging" burns the wood faster, making …hter fire; in a diesel's cylinders it burns more oil …iston stroke to deliver greater power.

…pressing the thin air of high altitudes to restore sea level power to airplane engines is a very effective use of Supercharging. It is equally effective for increasing the power of diesel, gas, or gasoline engines in the "heavy" air most of them have to work in.

Supercharging an engine with more air under pressure than normally drawn in on the suction stroke will burn correspondingly more fuel and will deliver as much as 40% more useful power . . . *without* appreciable added stress or wear on engine parts.

If you are a manufacturer, let us work with you in designing your engines to permit Supercharging. If you plan to buy engines, ask if they are designed for Supercharging.

Whether the bulldozer goes right through or backs off for a second or third crack at the obstacle may depend on whether its engine is Supercharged.



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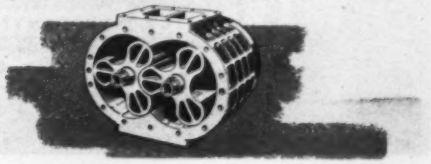
Milwaukee 9 Wis.

DIVISION OF BORG-WARNER

Only two moving parts, precision-fitted, make the McCulloch Supercharger highly efficient and free of maintenance troubles in the field.



WHEN SPLIT SECONDS *Count!*

To smash strafing planes coming in fast from any angle, self-powered multiple mounted machine guns enable gunners to concentrate on hitting the targets, while speedily and effortlessly the guns are swung around, raised or lowered. One more service stripe for the hundreds of thousands of Briggs & Stratton engines now with our armed forces.

THE urgent necessity of dependable power for purposes never before imagined, have revealed the amazing versatility of Briggs & Stratton 4-cycle, air-cooled gasoline engines. Their stamina, rugged dependability and superior performance under circumstances rarely encountered in peacetime, have demonstrated Briggs & Stratton high standards of quality in precision manufacture, and substantiated their recognition as "the world's finest air-cooled gasoline engines."

Our years of experience in design and production of air-cooled engines is again available to you on present problems or in your planning for postwar gasoline engine requirements.

"It's powered right—when it's powered by Briggs & Stratton."

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MILWAUKEE 1, WISCONSIN, U.S.A.

BACK THE INVASION
BUY WAR BONDS

Markwell & Associates and went into business for himself as a consulting engineer. He still has an interest in the firm.

Mr. Markwell has been in government work since 1933, when he was appointed senior engineer examiner in the Tennessee State office of the Public Works Administration at Nashville. Two years later he was promoted to the office of PWA state director of Tennessee, a position he held until his appointment in November, 1937, as chief project engineer for PWA power developments in the Tennessee Valley area, with headquarters at Chattanooga. He was transferred to the Santee-Cooper power project at Charleston in July, 1938, and remained there until the project was substantially complete. The Santee-Cooper project continued under his jurisdiction after he was appointed FWA regional director and assigned to the Richmond office.

C. L. Vickers, assistant regional director, who has been connected with the FWA regional office in Richmond since June, 1941, when the office was established, succeeded Mr. Markwell as regional director.

C. L. Vickers

Mr. Vickers, a native of Boone County, West Virginia, has had extensive experience in civil and mining engineering in West Virginia and Ohio.

From 1916 to 1938 he was in business for himself as a civil, mining and consulting engineer at Huntington, W. Va. In 1928, after disposing of his engineering interests, he entered the employ of the Cincinnati Union Terminal Co., which at that time was engaged on a $44,000,000 construction project.

In September, 1933, after the completion of the Cincinnati Union Terminal project, Mr. Vickers entered government service as senior examining engineer in the West Virginia office of the Public Works Administration. When that administration was regionalized in November, 1937, he was assigned to the Chicago regional office and remained there until the liquidation of PWA regional offices in 1940.

After the Chicago office closed, Mr. Vickers became resident engineer for the West Virginia State Road Commission, with offices at Parkersburg. He was called back into federal service in June, 1941, and was assigned to the FWA regional office in Richmond as regional engineer. He was in charge of the office until Mr. Markwell's appointment as regional director in August, 1942. At that time Mr. Vickers was appointed assistant regional director.

WHEN ENGINEERS IN "CIVVIES" MUST FIGHT ON C RATIONS

Not all the foxholes in this war are on active global fronts. Thousands of miles behind the lines, all-out offensives are being mounted and maintained by engineers in "civvies", to assure ample production of the materiel so vital to our boys over there.

Only the extra speed provided by modern equipment enables these home front fighters to overcome deficiencies in manpower and meet time-limit challenges.

Pictured here is a versatile, Thermoid-equipped unit manufactured by the Austin-Western Company, who report: "To what extent these machines are aiding in the 'all-out' drive cannot very well be revealed; but their liberal use in many quarters is a well-established fact. Only a small crew is needed to 'man all stations', even on the biggest units; and you can rely on these sturdy plants for profits that do not shrink after maintenance figures are added up, and for production that does not lag when rigid specifications must be met."

You, too, will find that Thermoid Products are *designed* for unusual service—and built to *deliver* that service in use. It's good business to do business with Thermoid.

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THE THERMOID LINE INCLUDES: Transmission Belting • F.H.P. and Multiple V-Belts and Drives • Conveyor Belting • Elevator Belting • Sheet Packings • Wrapped and Molded Hose • Industrial Brake Linings and Friction Products • Molded Hard Rubber and Plastic Products.

Don't put it off 'til tomorrow . . . BUY MORE WAR BONDS TODAY!

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

COACHELLA CANAL ARIZONA-CALIFORNIA-NEVADA

OWNER: Bureau of Reclamation, Boulder Canyon Project, Yuma, Ariz.

PROJECT: Earthwork, concrete lining, and structures for the Coachella Canal from Station 4,562+67 to Station 5,726+83, including the excavation for the canals and diversion channels, construction of canal embankment, construction of a check in canal, lateral turnouts, bridges, piers for wash overchutes, and drainage inlets. (Spec. No. 1065, Schedules III and IV.)

CONDITIONS: Contractor to complete work in 400 calendar days. Government to furnish cement, sand and coarse aggregate for concrete, reinforcement bars and fabric, joint material for joints in concrete, miscellaneous metal-work for structures, concrete pipe, and also all other materials which will become a part of the completed construction work. Wage rates specified are: skilled labor, $1.35 to $1.75 per hour; and common labor 87½c.

BIDS: Eleven bids were opened February 7, 1944 at Yuma, Ariz. ranging from the contract low $1,660,682 to $2,820,918.

LIST OF BIDDERS:

1. J. F. Shea Co., Inc., Los Angeles, Calif. (contract) $1,660,682
2. L. E. Dixon Co., Los Angeles, Calif. 1,948,050
3. Morrison-Knudsen Co., Inc., Los Angeles, Calif. 2,064,722
4. Winston Brothers Co., Los Angeles, Calif. 2,076,064
5. W. E. Kier Constr. Co., San Diego, Calif. 2,097,735
6. L. M. White Cont'g. Co., Santa Ana, Calif. 2,179,728
7. Ralph A. Bell, United Concrete Pipe Corp., Baruch Corp., Los Angeles, Calif. 2,196,281
8. Piombo Bros. & Co., and Louis Biasoti & Son, San Francisco, Calif. 2,215,001
9. Bressi & Bevanda Constructors, Los Angeles, Calif. 2,441,516
10. MacDonald & Kahn, Inc., Frederickson & Watson Constr. Co., San Francisco, Calif. 2,545,709
11. Mittry Bros. Constr. Co., Los Angeles, Calif. 2,820,918

Schedule III

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Excavation for canal	1,694,000 c. y.	$0.155	$0.20	$0.18
2. Excav. for diversion channel, dikes, and parallel drains	205,500 c. y.	.17	.30	.18
3. Excav. for bypass canals	80,400 c. y.	.18	.20	.18
4. Overhaul for bypass canals	13,000 sta. y.	.06	.06	.01
5. Compacting embankments	6,000 c. y.	.27	.20	.40
6. Excavation for structures	8,600 c. y.	.33	.25	1.20
7. Trimming foundations for concrete lining	337,500 s. y.	.14	.35	.30
8. Backfill about structures	5,300 c. y.	.96	.20	.26
9. Backfill at top of conc. canal lining	17,100 c. y.	.26	.50	.40
10. Compacting backfill	1,940 c. y.	1.28	1.00	2.90
11. Concrete in structures	442 c. y.	38.50	45.00	40.00
12. Concrete in drainage inlets	227 c. y.	12.00	45.00	40.00
13. Conc. in reinforced canal lining	32,850 c. y.	10.50	9.50	12.50
14. Place rein. bars in structures	55,600 lb.	.03	.03	.04
15. Place rein. fabric in canal lining	986,000 lb.	.02	.03	.03
16. Place elastic filler in joints	490 s. f.	.70	1.00	.60
17. Place rubber water stops in joints	28 l. f.	2.00	1.50	1.00
18. Riprap	35,570 c. y.	3.05	3.00	3.60
19. Erect timber in structures	2 Mbm.	128.00	150.00	75.00
20. Lay 18-in. concrete pipe	156 l. f.	1.30	2.50	1.00
21. Lay 24-in. concrete pipe	100 l. f.	2.50	3.00	1.50
22. Lay 30-in. concrete pipe	96 l. f.	3.25	3.50	2.50
23. Lay 36-in. concrete pipe	152 l. f.	3.85	4.00	3.00
24. Install slide gates and gate hoists	9,400 lb.	.10	.12	.08
25. Install miscellaneous metalwork	730 lb.	.13	.20	.15

Schedule IV

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Excavation for canal	918,000 c. y.	$0.155	$0.20	$0.18
2. Excav. for diversion channels and dikes, and parallel drains	326,000 c. y.	.17	.30	.18
3. Excavation for bypass canals	94,000 c. y.	.18	.20	.18
4. Overhaul for bypass canals	10,000 sta. y.	.06	.06	.01
5. Compacting embankments	6,700 c. y.	.27	.20	
6. Excavation for structures	7,300 c. y.	.33	.25	
7. Trimming foundations for concrete lining	310,400 s. y.	.14	.30	
8. Backfill about structures	3,500 c. y.	.96	.20	
9. Backfill at top of conc. canal lining	15,500 c. y.	.26	.50	
10. Compacting backfill	1,940 c. y.	1.28	1.00	
11. Concrete in structures	500 c. y.	38.50	45.00	
12. Concrete in drainage inlets	32 c. y.	12.00	45.00	
13. Conc. in rein. canal lining	30,200 c. y.	10.50	9.50	
14. Place rein. bars in structures	59,000 lb.	.03	.03	
15. Place rein. fabric in canal lining	901,000 lb.	.02	.03	
16. Place elastic filler in joints	470 s. f.	.70	1.00	
17. Place rubber water stops in joints	29 l. f.	2.00	1.50	
18. Riprap	45,000 c. y.	3.05	3.00	
19. Erecting timber in structures	2 Mbm.	128.00	150.00	
20. Lay 18-in. concrete pipe	292 l. f.	1.30	2.50	
21. Lay 24-in. concrete pipe	352 l. f.	2.50	3.00	
22. Lay 30-in. concrete pipe	288 l. f.	3.25	3.50	
23. Lay 36-in. concrete pipe	100 l. f.	3.85	4.00	
24. Install radial gates and gate hoists	10,400 lb.	.12	.12	
25. Install slide gates and gate hoists	17,800 lb.	.10	.12	
26. Install miscellaneous metalwork	1,650 lb.	.13	.20	

PROVO RESERVOIR CANAL, SIPHONS, FLUMES, ETC., UTAH

OWNER: Bureau of Reclamation, Provo River Project, Provo, Utah.

PROJECT: Construction of Olmsted siphon, American Fork Creek siphon, and Dry Creek siphon, each consisting of monolithic pipe structure with inside diameter of 8 feet; and construction of Highland Draw flume consisting of concrete structure 14-ft. wide, 6-ft. high, and 500-ft. long. Olmsted siphon approximately 4,250-ft. long; American Fork Creek siphon, 1,350-ft.; and Dry Creek siphon, 1,250-ft. Work also includes construction of all appurtenant and incidental structures and attachments.

CONDITIONS: Owner will furnish cement, reinforcing bars, precast concrete pipe, metal pipe, valves and fittings, radial gates and hoists, and miscellaneous metalwork. Contractor to furnish all sand and coarse aggregate for concrete. Time for completion, 300 calendar days. Wage rates are: skilled labor $1.25 to $1.75 per hour; common labor, 75c.

BIDS: Five bids were received March 15, 1944, ranging from the low of $359,311 to $447,765.

LIST OF BIDDERS:

1. J. B. & R. E. Walker, Inc., Salt Lake City, Utah (low bidder) $359,3[illegible]
2. Stroud-Seabrook, Layton, Utah 382,5[illegible]
3. David A. Richardson, Santa Cruz, Calif. 384,5[illegible]
4. Morrison-Knudsen Co., Boise, Idaho 440,8[illegible]
5. Vinnell-Engineers Limited, Alhambra, Calif. 447,7[illegible]

Item	Quan.	Unit Prices (1)	(2)	
1. Excavation, common, structures	82,000 c. y.	$0.61	$0.55	$1.
2. Excavation, rock, structures	3,000 c. y.	6.50	5.00	1.
3. Excavation, common, for river-channel change and for wasteway channel	10,500 c. y.	.50	1	1.
4. Excavation, rock, for river-channel change and for wasteway channel	50 c. y.	10.00	5.00	1.
5. Overhaul	3,500 sta. y.	.03	.05	
6. Compacted embankment	6,000 c. y.	.45	2.00	1.
7. Backfill	63,000 c. y.	.39	.35	
8. Compacting backfill	6,500 c. y.	1.00	5.00	1.
9. Dry-rock paving	30 s. y.	2.50	5.00	1.
10. Riprap	40 c. y.	7.00	7.00	1.
11. Rock backfill	3,000 c. y.	2.00	4.00	1.
12. Constructing reverse filter	10 c. y.	3.00	10.00	4.
13. Concrete in structures	7,600 c. y.	25.17	22.00	25.
14. Place reinforcement bars	1,900,000 lb.	.0234	.03	
15. Welding 1¼-in. sq. reinforcing bars	27 welds	3.00	5.00	
16. Place rubber water stops in joints	540 l. f.	2.00	1.50	
17. Place metal water stops in joints	40,000 lb.	.0023	.08	
18. Place elastic joint filler in joints	410 s. f.	1.50	.90	
19. Lay 24-in. concrete pipe	80 l. f.	1.50	2.00	1.
20. Install radial gates and gate hoists	7,000 lb.	.10	.20	
21. Install miscellaneous metalwork	36,000 lb.	.05	.20	
22. Paint inside surfaces of conc. pipe	2,500 s. f.	.06	.10	

NTRODUCING...

The ALL WEATHER "BUMBLEBEE"

for outdoor welding

Here's a rugged Wilson AC machine that is ideal for welding in exposed areas and wherever excessive moisture is encountered. Neither snow, sleet, nor rain hinders its reliable, efficient performance. Note these distinctive features:

1. Fully protected against moisture by special moisture-proof insulation.
2. All inside parts are protected by a heavy coating of moisture-proof paint.
3. Enclosed in a sturdy weather proof case, finished in durable, outdoor enamel. Special gaskets and louvers prevent entrance of rain, sleet, snow, etc.
4. Equipped with an automatic low-voltage contactor which instantly reduces open circuit voltage to approximately 40 volts. When the arc is struck, the contactor closes immediately, after which the performance of the transformer equals that of equivalent standard AC welders.

In all other details the All-Weather "Bumblebee" is identical to the standard-type Wilson "Bumblebee" AC machine. It offers the same operating advantages over equivalent DC welders – 15% to 30% more welding per work day, better quality welds, improved power factor, and easy maintenance. It is furnished either as a stationary unit or mounted on a sturdy, stamped-steel, 3-wheel carriage where portability is required.

The All-Weather "Bumblebee" is made in 300 and 500 amp. sizes. Other Wilson AC welders are made in sizes from 100 to 1000 amperes capacity. Mail the coupon for free catalog which gives complete details.

WILSON

WILSON WELDER and METALS CO., INC.

General Offices: 60 East 42nd Street, New York 17, N. Y.

Send for free Catalog

WILSON WELDER & METALS CO., INC.
60 East 42nd Street, New York 17, N. Y.

Gentlemen: ENR

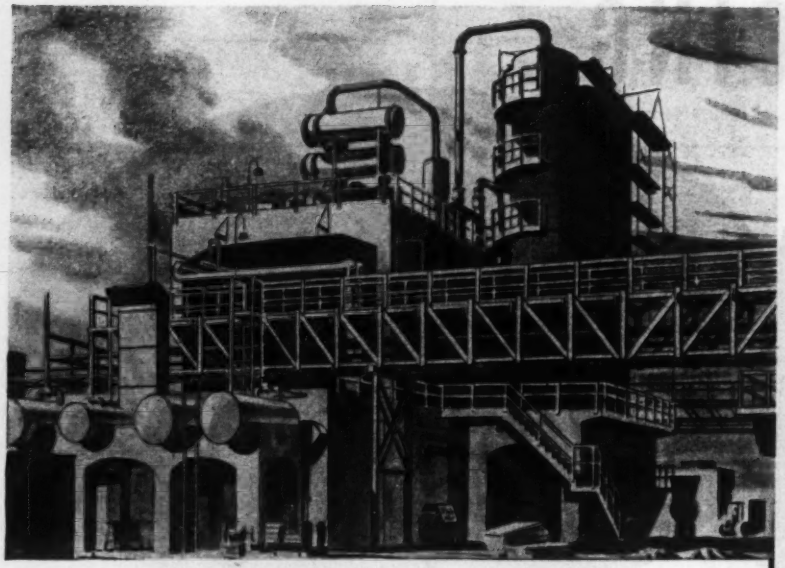
Please send to me by return mail a copy of the "Bumblebee" AC Machine Catalog (ADW-53).

NAME..... TITLE.....

FIRM.....

ADDRESS.....

CITY..... STATE.....



Flame-proof wood helps U. S. deliver "home grown" rubber

SYNTHETIC rubber plants are using flame-proof wood in their stairways, platforms, supports, walkways and railings. Wood is light in weight, easy to handle and erect. It goes up fast.

MINALITH* fire retardant, driven deep into the wood by vacuum-pressure treatment, enables it to stand up under flash fires. It won't carry fire, simply chars under continued exposure to flame. Structural members retain their high strength without sudden collapse when exposed to flame.

WIDELY USED in the war effort for structures where fire hazards exist—warehouses, blimp hangars, loading platforms—this flame-proof lumber promises to be equally valuable in postwar construction. So, too, does Wolmanized Lumber*: ordinary wood made highly resistant to decay and termite attack by impregnation with Wolman Salts* preservative. A long history of successful performance proves the reliability of the vacuum-pressure process employed in treating with either compound.

CONSIDER Minalith-treated lumber as a means of combating fire: Wolmanized Lumber for protection against decay and termite attack. All of the usual advantages of building with wood are retained. The wood is clean, odorless and paintable. These two types of treated lumber will be available, just as soon as the war permits, through regular trade channels. American Lumber & Treating Company, 1649 McCormick Bldg., Chicago 4, Illinois.

*Registered trade marks

WOOD THAT'S Alloyed FOR SAFETY AND ENDURANCE

AMERICAN LUMBER & TREATING COMPANY

NEW AIDS TO THE CONSTRUCTOR

Iron Cement

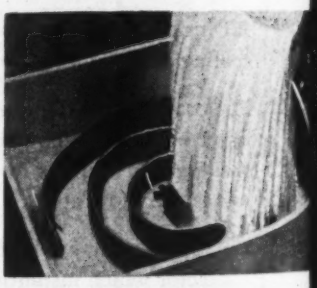
Said to harden rapidly like iron, a to possess the same expansion and c traction properties as iron itself, a n cement, called "Fix-Iron," may be u for repairing many types of broken cracked metal equipment.

This iron cement is in powder form be mixed with water as used. No hea required. It is available in 1 and 5 cans, 25 and 100-lb. kegs, and, household use, in 1¾ and 7-oz. gl jars.—*So-Lo Works, Loveland, Ohio.*

• • •

Grease Absorbent

Said to be a handy product in a industrial plant, a new oil and gre absorbent, "Speedi-Dri," has many u Among these are reclaiming of soaked belting, ropes, shoes and cl



ing; floor coating; removal of oil fr tools and metals to be painted.

Because "Speedi-Dri" has fire-resi ant qualities, it can be used to repla sand in fire buckets; it is also valuable deodorizing and in increasing light r flection, it is claimed.—*Refiners Lub cating Co. of New York,* and *Wrens Petroleum Products Co., Philadelphi*

• • •

Building Wire

Specially designed for installation wet places, a new small-diameter Ty SNW Flamenol building wire is a

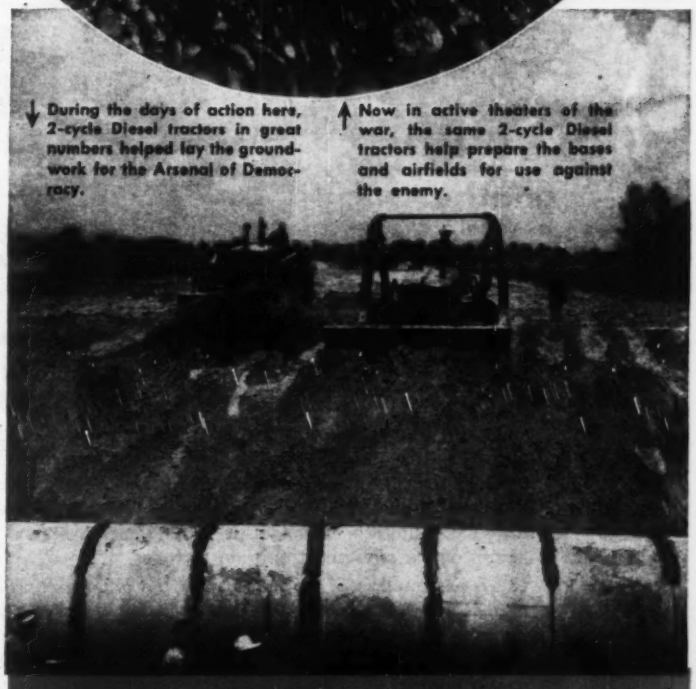
Still PUSHIN'

SIGNAL CORPS PHOTO

y're going big over
e as they did over
! The same 2-cycle
sel tractors that
ped rush through
huge home front construction pro-
m the last few years are showing
still have plenty of service left . . .
now handling and licking even
e difficult work for the Armed Forces
rseas.

fter tough day and night shifts on
big ordnance jobs here, they were
in tip-top operating condition in a
y and shipped to distant areas of
vity. Much of the overhauling was
dled by Allis-Chalmers dealers
se skill, proper tools and genuine
s made A-1 repairs a certainty.

low is the time to plan your future
-moving methods. Now is the time
nvestigate 2-cycle Diesel power . . .
what it will do for you! Why not
it over with your Allis-Chalmers
er! Write for literature.



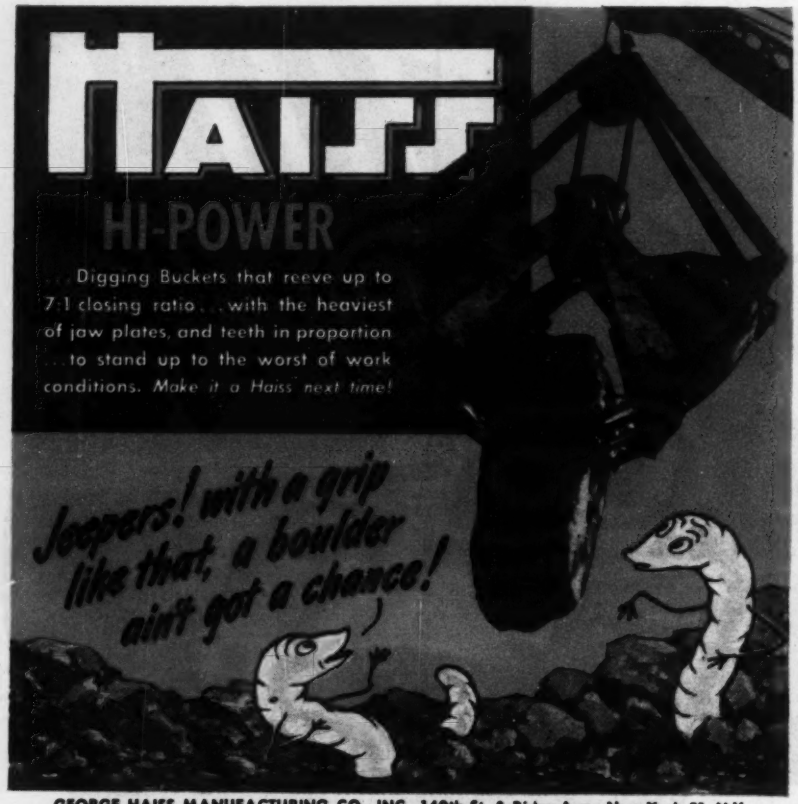
↓ During the days of action here, 2-cycle Diesel tractors in great numbers helped lay the groundwork for the Arsenal of Democracy.

↑ Now in active theaters of the war, the same 2-cycle Diesel tractors help prepare the bases and airfields for use against the enemy.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

2-CYCLE THE MODERN DIESEL POWER


HAISS
HI-POWER
Digging Buckets that reeve up to 7:1 closing ratio . . . with the heaviest of jaw plates, and teeth in proportion . . . to stand up to the worst of work conditions. Make it a Haiss next time!
Jeepers! with a grip like that, a boulder ain't got a chance!

GEORGE HAISS MANUFACTURING CO., INC., 140th St. & Rider Ave., New York 51, N.Y.
Bucket agencies throughout the country. Write, wire for prices, delivery or catalogs.

SUPERFINISHED CRANKSHAFTS
another "PLUS FEATURE"
IN ALL WISCONSIN *Air-Cooled* ENGINES

The very ingenious, specially designed machine illustrated above, puts a mirror-smooth *superfinish* on the crank-pins of all Wisconsin Air-Cooled Engines. By combining perfectly synchronized rotating and oscillating polishing movements, absolutely uniform diameter is maintained over the full length of the crankshaft bearing surfaces.

This is just another of the many small, but *important production details* that account for Wisconsin heavy-duty serviceability and smooth, efficient operation. Just another reason, too, why *your equipment* should be powered by a Wisconsin engine.

Most H.P. per pound

WISCONSIN MOTOR Corporation
MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

proved by the Underwriters' Labora ries in sizes 14 to 4/0 inclusive. T thermoplastic insulation, in addition low moisture absorption, is said to superaging, high in dielectric streng resistant to oils, acids, alkalies flame. It also will not support comb tion, and its temperature rating is deg. C. The wire's small diameter space-saver.

This wire, with a hard, smooth, gl finish, is self-protecting, requiring braid. It is striped for grade identifi tion.—*General Electric Co., Bridgep Conn.*

• • •

Moulded Brake Lining

Developed for use with external b or contracting type brakes, an improv moulded brake lining, with wire b

reinforcement, has just been announc to replace critically scarce woven br lining.

Known as External Dura-Blok, lining is available in rolls in a comp range of sizes up to ⅜ in. thick by 6 wide.—*Gatke Corp., 228 North La S St., Chicago 1, Ill.*

• • •

High-Frequency Generator

A great many combinations of voltages and frequencies can be with a new motor generator, the ma facturer claims. The machine is a mo and generator with frames cast integ The cores of the motor and generat are two distinct armatures, but they mounted on one common shaft. T whole assembly is encased in oil, a and water resisting plastic, and all volving parts are carefully balan statically and dynamically.

This light, compact unit, weighi about 110 lb. net, is approximately 1 in. long, 8¾ in. wide and 13¼ in. h Machines may be built to special spec cation.—*Kato Engineering Co., M kato, Minn.*

• • •

Detachable Hose Fitting

Unusual simplicity characterizes latest addition to an available line

OU PICK THE ROCK-

e'll pick the Timken Bit to match it!

Four major factors are responsible for the outstanding success of the Timken Rock Bit: our superior method of attachment, with shock-taking shoulder; a bit for every kind of rock, each scientifically designed to do its special job with maximum effectiveness; our intimate knowledge of rock formations and rock drilling; nation-wide service facilities from 15 factory branches supplemented by a network of Authorized Distributors, conversion and reconditioning shops, all strategically located for instant availability.

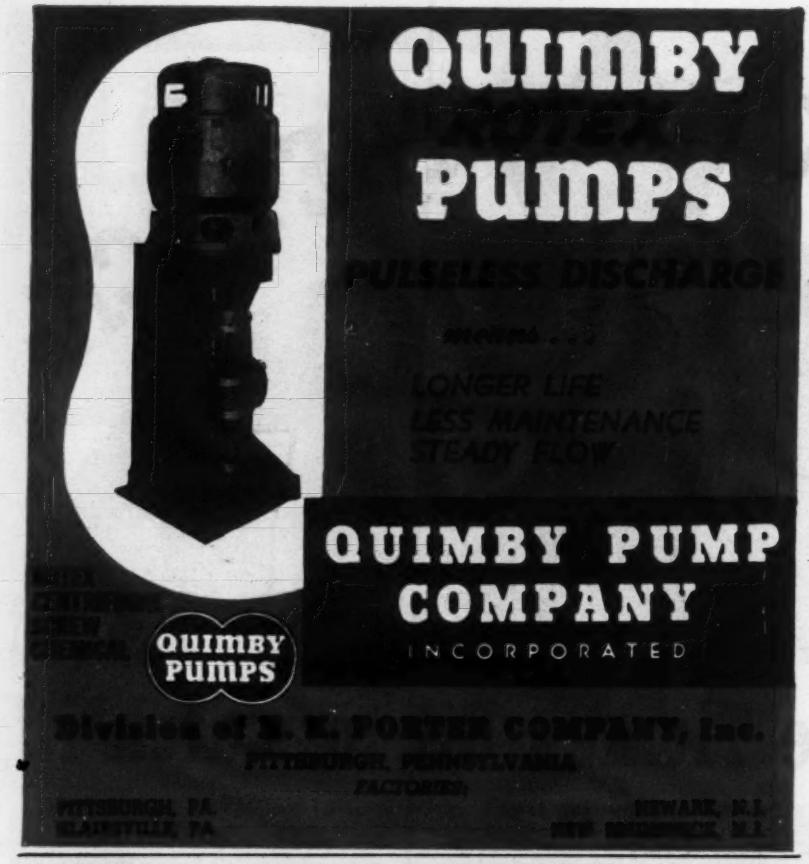
Important as the performance of the Timken Rock Bit is today, it will be even more important during the intensive years of reconstruction that lie ahead; then its ability to effect radical savings in time and cost will help users to operate profitably while meeting any competitive challenge.

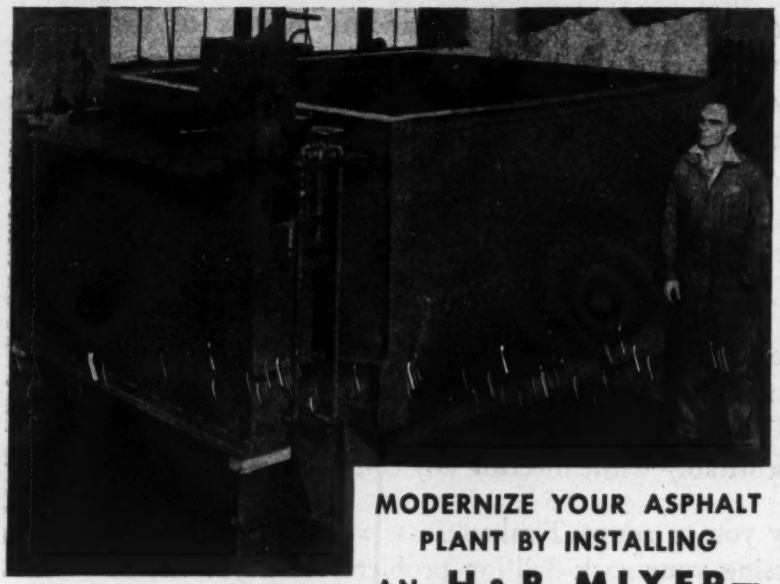
That's why it will pay you to adopt Timken Bits *now*. May we have the privilege of discussing your rock drilling problems with you in the near future? The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

REG. U. S. PAT. OFF.

ROCK BITS





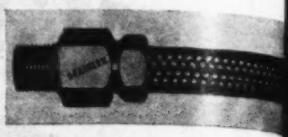
MODERNIZE YOUR ASPHALT PLANT BY INSTALLING AN H&B MIXER—

☆ H & B Asphalt Mixers are designed and built to give continuous, trouble-free, economical service under the most severe operating conditions. Careful engineering study, backed by nearly fifty years of specialized experience and applied to the suggestions and experience of practical plant operators, insures equipment that is dependable, economical, durable. 15 standard models (both steam and hand operated) ranging in batch capacity from 400 lbs. to the 8,000-lb. giant shown above. Write for literature and prices.

H&B ESTABLISHED 1867

HETHERINGTON & BERNER INC.
700 Kentucky Ave., Indianapolis 7, Ind.
America's Pioneer Builder of Asphalt Plants

detachable type hose fittings. The Seamlex "D.T." fittings have only parts, but are said to provide safety against leakage, due to metal-to-metal seat, the conc



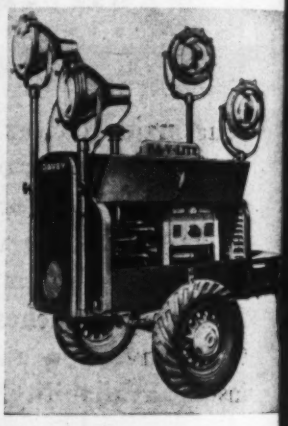
guide to maintain the tube in c central alignment, and the an stop which prevents stripping the and tube damage.

This type of fitting is especiall ommended for all-around efficienc economy at temperatures above 25 F.—*Seamlex Co., Inc.*, 27-27 Je *Ave., Long Island City, N. Y.*

• • •

Portable Light and Power

Bringing light and power to jobs, the new Da-V-Lite unit heavy-duty, 4-cylinder, V-type, air engine, operating a Westinghouse phase, 60-cycle, 120-volt gen which delivers 5 kw. Four mode



available, either skid mount spring mounted on two wheels.

The "Floodlight Model" is de to work-light a large area; the "S light" throws an intense light smaller area, or projects light siderable distance; the "Standard bination" combines two 16-in. an 18-in. lights; and the "Beacon" veloped for directional lighting fields, or coastal emergency work

The power unit on all models closed in a sheet-steel, weather body, with an illuminated control —*Davey Compressor Co., Kent,* distributed by *Westinghouse El Supply Co.*

• • •

Airmotor

Explosive and inflammable ga ards in engine operation are

Synthetic Rubber

Replaces NATURAL RUBBER INSULATIONS AND SHEATHS ON SIMPLEX WIRES AND CABLES

Early in the war the scarcity of natural rubber made conservation necessary in order to make the best use of what was available. Our standards of quality and service had to be maintained with less rubber than we had been using. A few months ago, because of the rapidly dwindling supply of natural rubber, a complete change to synthetic rubber became imperative. Natural rubber could no longer be used in conductor insulation or cable sheath.

In anticipation of just such a situation, we already had investigated available substitute materials and were well along in the development of insulations and sheaths to replace all of our standard natural rubber compounds. The change-over is now practically complete.

A synthetic rubber compound has been provided to replace each of our special purpose, natural rubber insulations and sheaths. Laboratory tests and service records already indicate that they may be depended upon for trouble-free, efficient service. The technical and engineering skill that made our natural rubber compounds outstanding is now focused on obtaining even better quality and service with the new synthetic compounds.

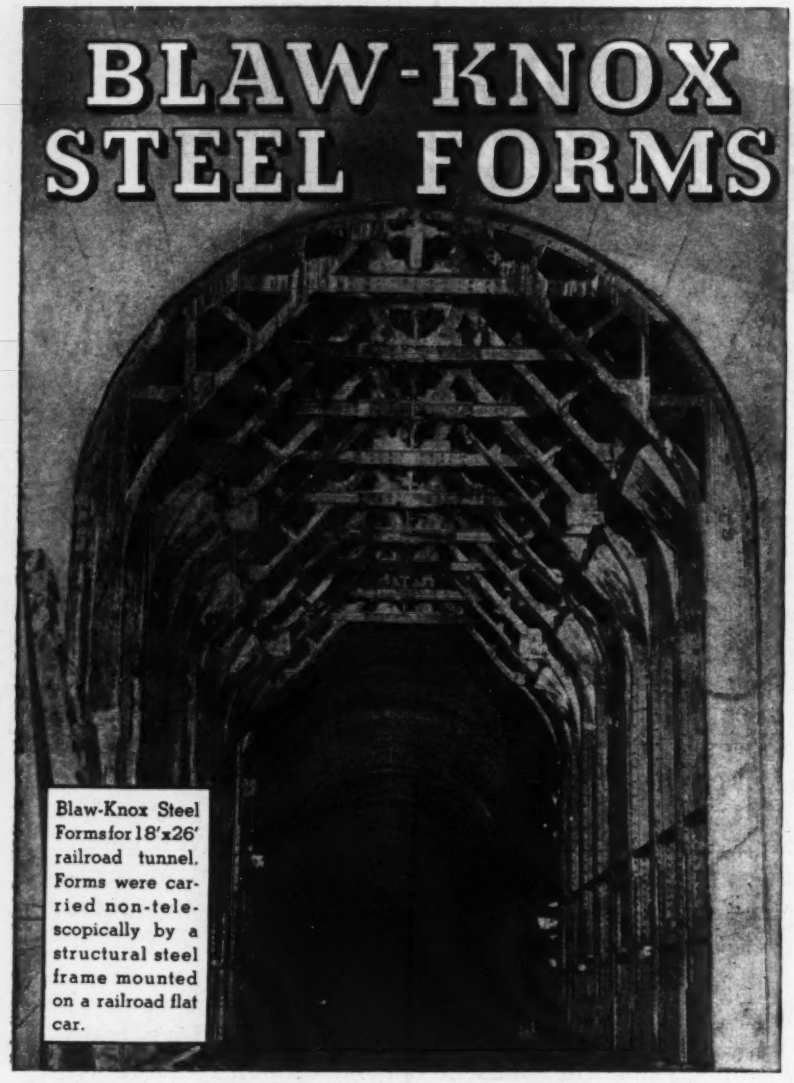
If your postwar plans call for insulated wires and cables, or if you need them now for essential war work, it will be well worth your while to learn more about Simplex wires and cables with their new synthetic insulations and sheaths.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

Simplex

WIRES and CABLES

BLAW-KNOX STEEL FORMS



Blaw-Knox Steel Forms for 18'x26' railroad tunnel. Forms were carried non-telescopically by a structural steel frame mounted on a railroad flat car.

For a Better Job in Less Time

The design and fabrication of heavy forms is no "side line" at Blaw-Knox. An entirely separate department of Form Engineers has devoted years to this specialized business with many notable successes to prove their ability. From past experience they have learned how to plan a concrete construction job so that the work will proceed quickly, smoothly and at the lowest possible cost.

Current construction of a sufficiently urgent nature can now be served, and long range planning for future contracts can be aided by Blaw-Knox engineers.

BLAW-KNOX STEEL FORMS are used for the construction of
TUNNELS WALLS SEWERS DAMS BRIDGES PIERS
CONDUITS ROADS SEWAGE DISPOSAL PLANTS . . .
. . . and other varieties of concrete construction

BLAW-KNOX DIVISION of Blaw-Knox Co.
2001 FARMERS BANK BUILDING · PITTSBURGH, PA.
New York · Chicago · Philadelphia · Birmingham · Washington

minimized, it is claimed, by a new pressed-air-operated airmotor. This motor, in a wide range of speeds horsepowers, is reversible, with air control, and has no electric wiring other vulnerable parts to get out of mission easily.—*Leiman Bros., 1 Christie St., Newark, N. J.*

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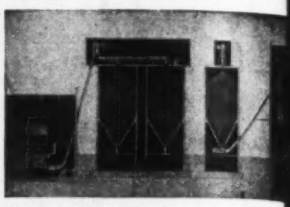
Conveyor Elevator

Designed for mass handling of flowing bulk materials, the new Uni-Flo is a conveying unit of continuous-stream type. This conveyor-elevator system is composed of a chain



equipped, closely-spaced scraper flight, operating in an enclosed

Some of the distinguishing features this unit, which conveys material zontally, vertically or at any angle clude: a positive discharge mechanism self-feeding and self-cleaning; speed operation; flexibility.—*Belt Co., Milwaukee, Wis.*

• • •

Coated Aluminum-Bronze Electrode

Production of welding deposits great strength, hot ductility and ance to corrosion is said to result the use of a new coated aluminum bronze shielded arc electrode—No. 100. This electrode can also be as a filler rod in carbon arc welding

These electrodes, for welding bronzes, malleable and cast iron steel, as well as dissimilar metals available in sizes from ⅛ to 5/32 in. length; and ¼ in., 18-in. length special order is required for sizes 5/32 to ½ in., 18-in. length.—*Air tion Sales Co., 60 East 42nd St. York 17, N. Y.*

• • •

Long-Taper Pipe Reamer

Extra long taper design has been in a new pipe reamer. As a result "Ridgid" reamer avoids flaring, or reducing the pipe wall, it is claimed it will also easily and cleanly cut from the inside of pipe or conduit

This pipe reamer is furnished ratchet handle, or the ratchet handle a Ridgid No. OOR ratchet threader be used.—*The Ridge Tool Co., Ohio.*

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

OPA-APPROVED increase in cement ceilings for eastern U. S. had the effect of raising maximum cement mill prices in Hudson, N. Y., and Northampton, Pa., by 20c. per barrel. This increase was reflected in New York and Boston prices which climbed 20c. and 22c. per barrel, respectively.

Boston prices for vitrified sewer pipe increased, and granite paving block and paving brick were higher. Short-leaf yellow pine rose $5.00 per M ft., B.M. in Kansas City and was $2.00 to $4.00 higher in St. Louis. Douglas fir was uv $1.00 to $4.50 on 1 and 2-in. boards in San Francisco, but was $1.00 to $2.00 lower on timbers.

Common brick prices rose in Boston, Kansas City and New York. Structural clay tile climbed in Boston, but was off slightly in Minneapolis.

Skilled and common construction labor rates are unchanged from April in the 20 reporting U. S. cities, but the Dominion Government has approved an increase for construction workers in Montreal.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F. O. B. CITY

	PORTLAND CEMENT—Per bbl., C/L lots, bbl. for bags, cash dis.		PORTLAND CEMENT—incl. 40c. per bbl. not deducted	SAND AND GRAVEL—Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK 8x8x16-in.; truckload del.; per block		CONCRETE* Ready Mixed 1:2:4, over 50 c.y., del.
	Cloth *a*	Paper	Bulk	Gravel, 1½ in.	Gravel ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand-grav.	Lt. wgt. Agg.	
.....	$2.77	$2.52	$2.47	$1.79	$1.89	$1.99	$1.79	$1.89	$1.59	$1.69	$0.17	....	$8.00
re.....	2.33	2.08	1.88	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	.125	$0.125*w*	7.25
gham...	2.50	2.25	2.10	1.75	1.75	1.50	.85	1.00	.90	1.15	.1425	....	5.80
.....	2.97*b*	2.72*b*	2.52	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	.13	.155*w*	7.25*m*
.....	2.70	2.45	2.30	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	2.15‡*d*	1.75‡	1.75‡	.16	.16*x*	....
ati....	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	.12	.15*w*	6.60
d.....	2.39	2.14	....	1.70*i*	1.55*i*	1.60*i*	1.73*i*	1.73*i*	1.73*i*	1.73*i*	.14	.15	7.30*i*
.....	2.52	2.27	2.07	1.50*p*	1.70*p*	1.10*p*	1.69*p*	1.79*p*	....	....	.15	....	6.20
.....	3.08	2.88	2.32	1.20	1.30	1.25	1.65	1.75	1.00	1.00	.15	....	7.25
.....	2.39	2.14	1.99	1.50	1.50	1.50	2.25	2.25	2.00‡	2.00‡	.14	.14*w*	7.00
City...	2.58	2.33	2.18	1.85	2.30	1.00	1.91	1.91	....	....	.125	.125*wy*	7.50*n*
les....	3.00*v*	2.40*v*	....	1.30	1.30	1.15	1.30*f*	1.30*f*	....	....	.04*bb*	.10*aa*	7.25
olis...	2.90	2.65	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	.12	.16	7.10*j*
al.....	....	1.95*rs*	1.79*rs*	....	1.65‡*t*	2.05‡*t*	1.05*ct*	1.15*ct*	....	....	.14*t*	.14*wt*	7.90*ls*
leans...	2.41	2.16	1.96	1.65	1.65	.90	....	....	....	....	.19	....	9.25
rk.....	2.89‡	2.64‡	....	1.60*de*	1.60*de*	.90*de*	1.70*de*	1.80*de*	....	....	.16	.14*wee*	7.50*k*
lphia...	2.33	2.08	1.88	1.55‡	1.65‡	1.20‡	1.90	1.95	1.10	1.10	.155	.155*w*	8.20
rgh.....	2.45	2.20	2.00	1.65‡	1.65‡	1.85‡	2.25‡	2.25‡	1.50	1.50	.17	.17*s*	8.25
n.....	2.80	2.52	....	1.75‡	1.50‡	1.25/1.50‡	1.10*h*	1.10*h*	.75*g*	.75*g*	.13	.15*y*	8.00
ncisco..	....*u*	2.21	1.91	1.36	1.36	1.36	1.46	1.46	....	....	....	.20*aa*	7.55
.....	2.95*o*	2.75*o*	....	1.00*o*	1.00*o*	1.00*o*	2.00*o*	2.00*o*	....	....	.16	.16*y*	7.25

ivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off. *c* F.o.b. quarry. *d* Per cu. yd. *e* Barge lots alongside. *f* Crushed granite. *g* F.o.b. Granite City, Ill. *h* F.o.b. plant. three miles of Public Square. *j* 5% discount for cash. *k* Discount of nt for cash in 10 days. *l* Up to 200 cu. yd. *m* 50c. off for cash. *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included. *u* Price withdrawn. *v* 20c. per bbl. discount; 20c. allowed for returnable cloth bag. *w* Cinder. *x* Waylite. *y* Haydite. *z* Celocrete. *aa* Pumice. *bb* 4 x 8 x 12 in. *cc* Also 8 x 18 x 18 in.

ASH DISCOUNTS CEMENT to Contractors: truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount r bbl. for payment within 15 days of date of invoice. Subject discount 10c. per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

arge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
ton, Ind.....	$1.70	$1.65	Ironton, Ohio.....	$1.60	$1.55	Richard City, Tenn.....	$1.80	$1.75
Tex. (Inc. 9c. tax)...	1.84	1.79	Limedale, Ind.....	1.70	1.65	Steelton, Minn.....	1.80	1.75
al, Mo.....	1.70	1.65	Norfolk, Va.....	1.75	1.70	Universal, Pa.....	1.65	1.60
, N. Y.....	1.95	1.90	Northampton, Pa.....	1.75	1.70	Waco, Tex. (Plus 9c. tax in Tex.).	1.75	1.70
dence, Kans.....	1.70	1.65	North Birmingham, Ala.....	1.70	1.65	Montreal (8% sales tax incl.).....	1.68	1.67
						Discount 10c. per bbl. 20 days		

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F. O. B. CITY

	PAVING BRICK AND BLOCK Granite per M. lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	PAVING ASPHALT Per ton, less than 80 penetration Tank car	Drums	ASPHALT BINDERS—FLUXES Per gal., 80–300 penetration Tank car	Drums	CUTBACK ASPHALT Per ton Tank car	Drums	ROAD OIL Per gal. Tank car	ASPHALT EMULSION (Quick-breaking) Per gal. Tank car	Drums
.....	$73.00	$39.35	$2.25	$18.53*e*	$24.62*e*	$0.0740*e*	$0.1309*e*	$0.0807*he*	$0.1348*h*	$0.0676*e*	$0.0826	$0.1384
ore.....	150.00‡	48.00	80.00*m*	15.00*r*	21.00*r*	.06*r*	.09*r*	13.00*r*	23.00*r*	.065*r*	.07*r*	.14*r*
gham...	150.00	48.00	.....	17.95	.....†	.0747	.....†	.0834*h*	.....†	.065	.09	.....†
.....	85.00	59.00	3.75	14.20	20.00	....‡	.....‡	.....	.....	.....	.....	.....
.....	150.00	55.00	2.50/2.80*d*	14.00	22.50	13.00*g*	21.50*g*	.0575*h*	.15*h*	.05*n*	.09/10*n*	.13/.15*n*
ati....	120.00	50.00	.....	16.40	.....	.085	.....	12.25	.....	.07	.085	.....
nd.....	118.00	37.50	2.50	17.00	19.00	.085	.095	.10*h*	.15	.095	.09	.095
.....	.....	36.00	.....	13.65	20.30	.06	.11	16.00	24.80	.06	.05/.07	.07/.09
.....	.....	66.11	.....	11.00	.....	10.00	.....	.045*h*	.....	.....	.....	.....
.....	.....	37.50	.....	18.06*f*	25.60*f*	.0743	.128	.0718*h*	.119*h*	.067	.0775	.1149
City...	.....	40.00	.....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	.15
geles....	.....	50.00	.....	9.00*b*	23.00	9.50*bg*	24.00*bg*	9.50*b*	.....	.025	.072	.15
apolis...	.....	.....	2.30*d*	.....	27.70	.....	.126	.....	32.64	.....	.....	.....
al.....	92.40	.....	.....	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.135*hk*	.08*k*	.135*k*	.188*k*
rleans...	.....	.....	.....	13.50*a*	20.00*a*	.057	.088	.06*h*	.095*h*	.....	.080	.....
York.....	.....	65.00	.....	17.40	24.20*p*	14.00	.....	.0725*h*	.1325*hp*	.....	.0725*p*	.1225*p*
lphia...	140.00	58.00	4.06	15.00*r*	.....	14.00*r*	.....	.065*hr*	.....	.....	14.00*pr*	.....
rgh.....	135.00	38.75	.....	18.00	23.00	.09	.16	20.00	36.00	.07	.06	.11
is.....	.....	37.00	.....	16.00	22.00	15.00*g*	21.00*g*	.0575*h*	.1213*h*	.648	.0525	.1125
ancisco.	.....	40.00	.....	10.90	21.15	10.90*g*	18.00*gr*	12.90	17.50*r*	9.50*gr*	.0525	.1125
.....	.....	60.00*e*	.....	10.90*i*	23.40*i*	.....	20.40*gi*	11.40*i*	.....	.....	.0525*i*	.0625*i*

ivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3½x8½ in. *k* Tax included. *m* Per 8½ in. *d* 2½ in. 12-lb. treatment. *e* Local reduction due to 20% reduction thousand. † Available on priority only and quoted specially. *p* No steel drum tate class freight rates, only Georgia affected. *f* Mexican. *g* Per ton. shipments except to armed forces. *r* February 1943 prices, none later available.

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¼-in billet *b*	RIVETS ½-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes *e*	Tie Plates *e*
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....
Detroit	.....	2.27‡	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.47*a*	2.52*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.80*a*	.....	3.05	2.95*a*	.....	.....	.....	.....	.....	2.30

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates alone, Steelton, Pa., spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $1[illegible]

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¼ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq. yd., carload lots Std. diamond mesh, 3.4 lb	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING— Per 100 sq.yd., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd
Atlanta	$2.34	$2.40	$2.40	$.02½	$.10	$21.06	$23.00	$1.82	$1.35	$0.1719
Baltimore	3.70	2.90	2.75	.....	.10	22.50	24.50	1.70	1.27	.1611
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	21.00	1.80	1.34	.1701
Boston	3.85	3.51	3.36	$20 C.L	.10	18.50	29.50	1.76	1.31	.1656
Chicago	2.10*a*	2.15	2.15	.03	.05	21.50	23.50	1.67	1.25	.1575
Cincinnati	3.68	2.53*cd*	2.53*cd*	.....	.05	19.50	21.50	1.66	1.25	.1566
Cleveland	2.10*a*	2.15	2.15	.02½	.10	19.50	21.00	1.66	1.25	.1566
Dallas	4.25	3.17	3.17	.....	....	25.00	27.50	1.93	1.42	.1827
Denver	4.57	3.33*kl*	....	.....	....	26.50	26.50	1.97	1.45	.186
Detroit	3.65‡	2.52‡	2.52‡	.....	.10	30.00	30.00	1.68	1.26	.1584
Kansas City	4.19	2.61*cd*	2.61*cd*	.0	.05	24.50	26.50	1.78	1.33	.1683
Los Angeles	3.65*f*	2.575	2.425	.02½	.05	23.00	27.50	1.93	1.42	.1827
Minneapolis	3.81‡	2.73	2.73	.0	.10	25.00	27.00	1.80	1.34	.1701
Montreal	4.00*i*	2.90*i*	2.80*i*	.....	....	26.00*hij*	33.00*hij*	2.25*i*	3.14*i*	.228*i*
New Orleans	4.229‡*k*	2.52	2.52	.05	.10	19.00	21.00	1.82	1.35	.1715
New York	3.75	2.76*c*	2.76*c*	.....	.15	17.50	19.50	1.76	1.32	.1665
Philadelphia	3.66	3.82	....	.....	....	19.50	21.50	1.71	1.28	.1611
Pittsburgh	2.10*a*	2.15	2.15	.02½	.10	23.00	26.50	1.59	1.20	.1503
St. Louis	3.697	2.74	2.74	.0	.05	28.00	34.00	1.69	1.27	.1602
San Francisco	4.35	2.825	2.675	.02½	.10	21.00	24.50	1.93	1.42	.1827
Seattle	2.75*e*	2.80*e*	....	.....	....	34.50	38.50	1.93	1.42	1827

‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. * High scrap steel prices cut former 15c. differences between billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax. *j* August 1942 price; not on market. *k* Quotation on changed basis actual price change. *l* Approximate Denver price out of wholesale stocks, based on Chicago area; not comparable with preceding prices.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	Delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in	C 14–35 24 in.	WROUGHT STEEL PIPE— Full standard weight, *h* 1 to 3 in., Black %	Butt Weld 3½ to 6 in.; Galv. %	Black %	Lap [illegible] Galv. %
Atlanta	$49.66	$0.26*b*	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	48.2	54.2	59.7	[illegible]
Baltimore	53.00	.35	.60	2.65	7.25	160.00	200.00	.50	1.75	65.5	57.5	63.0	[illegible]
Birmingham	45.00	.275	.495	1.95	5.50	100.00	220.00	.50	1.70	62.2	54.2	59.7	[illegible]
Boston	55.40	.26	.50	2.20	6.25	.....	.....	.60	.....	....	....	....	....
Chicago	54.33	.35	.675	2.70	7.00	100.00‡	150.00‡	.45	1.85	66.0	55.0	64.5	[illegible]
Cincinnati	53.27	.231	.4455	1.80	5.125	105.00‡*s*	170.00‡*s*	.60*t*	1.70*t*	57.1	43.4	54.0	[illegible]
Cleveland	54.75	.224*ra*	.432*r*	1.80*r*	5.125*r*	90.60	139.40	.36	1.38	68.5	57.5	66.0	[illegible]
Dallas	56.43	.31	.58	2.25	5.00	90.00	110.00	.46	1.57	59.9	51.9	57.3	[illegible]
Denver	61.56	.29†	.52†	2.16†	3.00*n*	125.00	200.00	1.00	2.22	58.4	50.4	55.7	[illegible]
Detroit	54.75	.35	.675	2.70	7.75	135.00	200.00	.40	1.75	57.7	44.0	54.8	[illegible]
Kansas City	55.73	.315	.39	2.20	5.86	140.00	260.00	.45	1.60	35.9	46.4	46.6	[illegible]
Los Angeles	68.40	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	61.1	50.1	58.6	[illegible]
Minneapolis	59.00	.275†	.495†	1.98†	5.37†	.....	.....	.90	2.10	64.2	53.2	60.7	[illegible]
Montreal	67.00	.85*o*	1.50*o*	5.25*p*	8.50*ep*	45.00*m*	64.00*m*	.48*m*†	1.92*m*†	....	....	....	....
New Orleans	51.78	.26	.48	1.69	.....	150.00	220.00	.45	1.65	62.4	54.4	58.8	[illegible]
New York	52.40	.308	.594	2.52	6.45	.....	.....	.60	1.40	64.9	53.9	62.4	[illegible]
Philadelphia	51.00	.30	.58	2.50	7.50	150.00	225.00	.45	1.75	56.6	42.8	53.6	[illegible]
Pittsburgh	56.00	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85*g*	2.00*g*	68.5*i*	57.5*i*	66.0*i*	[illegible]
St. Louis	53.62	.28	.504	2.016	4.50	85.00	220.00	1.25*j*	2 25*k*	56.4	42.6	52.5	[illegible]
San Francisco	68.40	.3625*d*	.6525*d*	2.61	6.52	115.00	192.50	.58	2.34	45.0	31.0	41.0	[illegible]
Seattle	70.20	.375	.675	2.70	6.75	84.00	187.50	.51*f*	1.44*f*	....	....	....	....

‡ Delivered. † F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N. J. (base) $49.00. Based on existing freight rates; subject to rate change. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.; ½ in., 8½c.; ¾ in., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92. 3 percent tax on transportation costs not included. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from producing lowest price at destination. WROUGHT IRON PIPE: Base and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18; black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14; 8 in. black, 32½ galv. 17. *j* Reinforced; spec. C 76–37. *k* Reinforced; C 75–37. *l* Plus sales tax. *m* Tax included. *n* 27-in. pipe. *o* Less *p* Less 53%. *r* Truck delivery. *s* Price quotations on delivered basis since 1940; current f.o.b. price $84 for 6 in. ; $130 for 8 in. *t* Reinforced pipe since May,1937; current plain pipe prices are: 12 in., 36c.; 24 in. $1.50.

before and after

WATERFOIL

THE UNIQUE TREATMENT FOR EXTERIOR MASONRY SURFACES

HORN

LUMBER, TIMBER PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR — All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face)									LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD Rail freight increment (See note for base price)	
	All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)												
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 R2A	6x12 R2A	12x12 R2A	2x12 R2A	12x12 R2A	¼"	¾"
Atlanta	$37.00	$37.00	$32.00	$31.00	$31.00	$34.50	$46.00	.....	.....	$54.00	$64.00	$17.90	$21.35
Baltimore	43.00	45.00	42.00	42.00	43.00	48.00	65.00	.....	.....	115.00	120.00	18.25	22.25
	48.00	*48.00*	*56.00*	*55.00*	*55.00*	*55.00*	*68.00*	*$70.00*	*$70.00*	.....	.....	.....	.....
Birmingham	45.00	45.00	44.50	43.50	44.50	47.50	68.00	62.00	67.00	.....	.....	17.35	21.15
[1]	50.00	50.00	49.50	48.50	49.50	52.50	72.00	.....	.....	67.50	70.00	.....	.....
Boston ‡*	42.00[3]	45.00[3]	55.00[3]	60.00[3]	60.00[3]	65.00[3]	68.00[3]	.....	.....	72.00[3]	72.00	18.25	22.25
‡*	*50.00*	*50.00*	*55.00*	*60.00*	*65.00*	*65.00*	*72.00*	*72.00*	*72.00*	.....	.....	.....	.....
Chicago	54.00	54.00	55.00	54.00	54.00	60.00	68.00	.....	.....	80.00[3]	95.00[3]	14.60	17.80
	55.00	*55.00*	*54.00*	*54.00*	*54.00*	*55.00*	*66.00*	*56.00*	*67.00*	.....	.....	.....	.....
Cincinnati	47.50	49.00	42.50	42.50	42.50	44.50	67.00	.....	.....	65.00	65.00	17.35	21.15
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cleveland	42.50[h]	42.50[h]	52.50[h]	51.00[h]	65.00	65.00	83.00	83.00	83.00	.....	.....	17.75	21.60
Dallas [e]	45.25	45.25	44.50	43.00	43.00	47.25	60.75	58.75	58.75	88.75	85.00	14.60	17.80
Denver ‡	63.50[4]	62.00[4]	65.00[4]	65.00[4]	65.00[4]	66.00[4]	69.00[4]	*83.00*	*89.00*	.....	.....	10.45	12.70
Detroit	61.00	61.00	57.75	57.75	57.75	62.75	72.75	75.00	90.00	70.75	90.00	17.35	21.15
	57.00	*57.00*	*57.00*	*57.00*	*62.75*	*63.75*	*71.00*	*75.00*	*76.00*	.....	.....	.....	.....
Kansas City [a]	69.00	69.00	67.00	65.50	67.00	69.00	84.00	.....	.....	84.00	94.00	12.60	15.40
	60.00	*60.00*	*58.00*	*58.00*	*58.00*	*58.00*	*75.00*	*80.00*	*80.00*	.....	.....	.....	.....
Los Angeles [a]	*60.00*	*60.00*	*60.50*	*60.75*	*59.25*	*59.25*	*72.75*	*72.00*	*72.00*	.....	.....	9.90[h]	12.10[h]
Minneapolis [2b]	59.00[3]	59.00[3]	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.60	15.40
‡	*56.50*	*56.50*	*55.75*	*56.00*	*55.00*	*56.25*	*63.25*	*62.00*	*62.00*	.....	.....	.....	.....
Montreal [f]	*58.00*	*61.00*	*54.00*	*58.00*	*60.00*	*66.00*	.....	.....	.....	220.00	220.00	.....	.....
	54.00	*54.00*	*57.00*	*57.00*	*57.00*	*58.75*	*62.00*	*62.00*	*62.00*	.....	.....	.....	.....
New Orleans	40.00	40.00	37.00	35.00	34.00	36.00	46.00	.....	.....	55.00	69.00	14.60	17.80
	31.00	*31.00*	*33.00*	*31.00*	*34.00*	*33.00*	*33.00*	.....	.....	.....	.....	.....	.....
New York	67.50	67.50	62.50	62.50	62.50	64.00	74.00	.....	.....	120.00[f]	125.00[f]	18.35	22.35
‡	.....	.....	*65.00[i]*	*65.00[i]*	*65.00[i]*	*65.00[i]*	[Range from $75 to $95]			.....	.....	.....	.....
Philadelphia	65.00	70.00	70.00	70.00	70.00	70.00	75.00	.....	.....	130.00	130.00	18.25	22.25
	70.00	*75.00*	*70.00*	*70.00*	*70.00*	*70.00*	*83.00*	*90.00*	*90.00*	.....	.....	.....	.....
Pittsburgh	50.80	53.20	62.75	55.00	60.85	62.50	76.25	.....	.....	.....	.....	18.10	22.65
	69.20	*68.10*	*66.10*	*65.50*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	.....	.....	.....	.....
St. Louis [2c]	59.00	59.00	56.00	55.00	56.00	57.00	69.00	*75.00*	*75.00*	88.00	87.00	14.60	17.80
San Francisco [d]	*41.00*	*41.00*	*36.50*	*36.75*	*35.75*	*35.75*	*37.50*	*36.00*	*35.00*	.....	.....	7.30[g]	8.90[g]
Seattle	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*35.00*	*40.00*	*40.00*	*40.00*	.....	.....	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [5] Western Pine, No. 3 Common. [7] Spruce. [8] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* F.o.b. cars San Francisco freight rate. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax. * Prices for truck delivery; no longer quoting carload lots f. o. b. city.

Note: Special concrete form grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. Seattle base price on ¼", $95.15; on ¾", $104.85; price includes oiling and marking charges. For other centers add rail freight increment from table or price for size. For resin dipped treatment, add $10.50 per M. *g* Lower rate by water shipment. *h* 50,000 lb. minimum. *i* Ranges from $65 to $69. *j* Average price. *k* August 1943 price. *l* September price; none later available.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS — Discounts from jobbers list, Aug. 15, 1938 Single or Double A quality	Thickness B quality	EXPLOSIVES — Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*	
Atlanta	75%	75%	$0.15	
Baltimore	78%	79%	.15	
Birmingham	76%	76%	.105	
Boston	77%	78%	.15	
Chicago	77%	77%	.15	
Cincinnati	77-10%	77-10%	.15	
Cleveland	77-10%	77-10%	.19	
Dallas	76%	76%	.1625	
Denver	76%	76%	.155*e*	
Detroit	77%	77%	.1575	
Kansas City	77-10%	77-10%	.155	
Los Angeles	86%*d*	88%*d*	.1575	
Minneapolis	77%	77%	.155	
Montreal	40-10-5*ab*	40-10-10*ac*	.1675†	
New Orleans	70%	75%	.16	
New York	81%	82%	.22*f*	
Philadelphia	78%	79%	.15	
Pittsburgh	79%	79%	.1225	
St. Louis	77-10%	77-10%	.155	
San Francisco	66%	73%	.155	
Seattle	75%	75%	.1575†	

Price of 60% Ammonia Gelatin in $0.01 per lb. higher than 40%

a Discount from list Sept. 1939; sales tax included, but 6% tax exemption not allowed for. *b* Single thickness. *c* Double thickness. *d* Discount from jobbers' list Sept. 15, 1928.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal St. add delivery charge of $6.00 per trip. † F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb. (except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.105	$0.13	$0.15
W. of Miss. to Rocky Mtn. States, Fla. and Maine.	.11 -.1175	.135 -.1475	.155 -.1675
Rocky Mtn. States	.11 -.1225	.135 -.1525‡	.155 -.1725‡
Pacific N. W. States	.1075-.12	.1375-.15	.1575-.17
Pacific S. W. States	.1050-.1125	.135 -.1425	.155 -.1625

‡ F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, fir and pine, bark on, f.o.b. cars, New York. Fir base on Wash. and Ore. points to New York shipping area; pine based on freight to Norfolk.

Dimensions	Points	Length	By Rail Pine*	Fir
12-in. at butt	6-in.	30 to 50-ft.	$0.34	...
12-in.— 2-ft. from butt	6-in.	50 to 59-ft.	.35	...
12-in.— 2-ft. from butt	6-in.	60 to 69-ft.	.36	...
12-in.— 2-ft. from butt	6-in.	90 to 100-ft.	....	.53
13-in.— 3-ft. from butt	5-in.	91 to 100-ft.	....	.55
14-in.— 2-ft. from butt	6-in.	50 to 69-ft.	.41	.62
14-in.— 2-ft. from butt	6-in.	70 to 79-ft.	.43	.59
14-in.— 2-ft. from butt	5-in.	80 to 85-ft.	.53	...
14-in.— 2-ft. from butt	5-in.	85 to 89-ft.	.56	....
14-in.— 2-ft. from butt	5-in.	90 to 100-ft.	....	.61

* Pine piling over 80-ft. available only in limited quantities.

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8' Untr.	6"x8"x8' Tr.	7"x9"x8'6" Untr.	7"x9"x8'6" Tr.
Boston	Oak	$1.50	....	$2.00	....
	Pine	2.00	$3.00*a*	2.50	$3.00*a*
New York	S. L. Sap Pine	1.43/1.54	2.59	1.76	2.91
	Mixed Oak	1.71	2.59	2.42	3.18
Birmingham	White Oak	1.00	1.60*a*	1.30	2.25*a*
Chicago	Red Oak	....	2.00/2.25*a*	2.87	3.00*a*
Los Angeles	Douglas Fir	2.00	3.25*a*	2.90	4.75*a*
Philadelphia	Red Oak	....	2.10*ag*	....	3.25*ag*
St. Louis	White Oak	1.48	....	2.04	....
	Red Oak	1.48	2.05*a*	2.04	2.95*a*
	Sap Pine or Cypress	1.53	....	1.91	....
San Francisco	Douglas Fir	1.25*bf*	....	....	3.00*a*
Montreal	Birch or Maple	.85	.95	....†	....†

Tr.— Treated; Untr.— Untreated. *a* Creosoted *b* 6"x8"x8'6". *c* Empire cell. *d* Zinc. *e* Green. *f* F.o.b. cars. † Out of market. *g* January 1943 price; none later available.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb.	$2.80- 3.00
Chlorine cylinders, liquid, per lb. delivered	.08
Calcium chloride, 77-80%, flaked, 100-lb. paper bag, del'd, ton	18.50-35.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb.	1.60
Soda ash, 58%, in paper bags, per 100 lb. dense	1.70
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00-25.00
Sulphate of copper, in bbl., per 100-lb	5.00

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AMERICA'S CHOICE SINCE 1874

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE—PARTITION—SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE—LOAD BEARING—SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity, Common backing	Straight hard	LIME Per ton, Hydrated finishing	In paper, Common hydrated	Carload lots, Pulverized or lump
Atlanta	$104.00	$114.00	$199.00	$234.00	$244.00	$250.00	$13.50	$18.04	$26.54	$15.04	$15.04
Baltimore	84.00	90.00	170.00	200.00	260.00	300.00	15.90k	19.00k	18.00	13.00	2.30m
Birmingham	80.00	85.00	160.00	191.00	252.00	288.00	14.50	17.00	18.11	13.64	2.25m
Boston	96.30a	102.80a	192.70a	218.30	283.00	323.40	20.20i	20.20i	17.50†	12.50†	14.92†
Chicago	72.00	77.00	145.00	197.00	243.00	278.00	12.50	13.50	17.00	15.00	12.00
Cincinnati	65.55	69.90	131.20	148.70	210.35	240.45	20.00	22.00	15.50	13.00	.....
Cleveland	60.00	64.00	120.00	144.00	193.00	221.60	17.00	17.00	15.75j	13.25j	3.50m
Dallas	62.50	67.50	135.00	162.00	212.50	263.00	13.50i	15.00i	19.00	15.00	15.00
Denver	84.80	95.40	153.70	178.20	212.00	227.90	14.50	18.00	25.00j	17.00j	20.00j
Detroit	86.05x	91.80x	172.10x	213.00x	268.00x	311.60x	20.00	21.00	18.00	16.00	16.00
Kansas City	67.00	69.00	89.00c	128.00	163.00	189.60	15.50	16.00	19.32	13.00	10.92
Los Angeles	73.50†r	89.50†r	128.00c†r	210.00†r	368.00†r	469.00†r	13.50	15.00	16.50	17.50	17.90
Minneapolis	81.00b	86.40b	159.90b	.....	177.00b	246.00b	13.60	15.60g	21.00	16.00	19.00
Montreal	94.55a	100.45a	199.50a	160.45a	109.40at	137.40av	21.08†u	28.35†u	24.60u	18.00u	.....
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	.....	18.30	12.08	14.10
New York	78.40	83.60	115.00c	193.30h	238.80h	295.60h	17.00/18.00	.....	20.00	14.00	17.00
Philadelphia	85.30	91.00	170.50	204.60	252.00	312.00	17.00	20.00	19.00	16.00	15.00
Pittsburgh	62.35	66.55	124.75	140.25	173.25	198.00	17.50	19.50	17.90	15.40	2.55m
St. Louis	67.00	95.00	130.00	190.00	244.00	290.00	18.00	17.00	22.00	18.00	2.50m
San Francisco	96.00	108.00	144.00	.....	.....	.....	19.00	.....	24.00	23.00	2.80m
Seattle	115.00	125.00	230.00	.....	.....	.....	20.00f	21.00f	20.00s	20.00s	20.00s

† F.o.b. a Smooth. b Carload lots delivered to job. c 6x12x12 in. d Not load bearing. e 48 lb. tile. f Less $1.00, g cash 15 days, balance 30 days g Selected common. h F.o.b. Perth Amboy, N. J. i F.o.b. Warehouse only. j LCL k $1.00 discount if paid in 10 days. l Lump. m Per bbl., 180 lb. o Per bbl., 200 lb. p 280 lb. bag. r 5% discount 10 days. s 2% discount f cash. t 5½x8x12. u 8% sales tax included. v 6x12x12-in. w Per 200 lb b x Prices also apply for Dec. and Jan.; market in Detroit unsettled; Tile scarce.

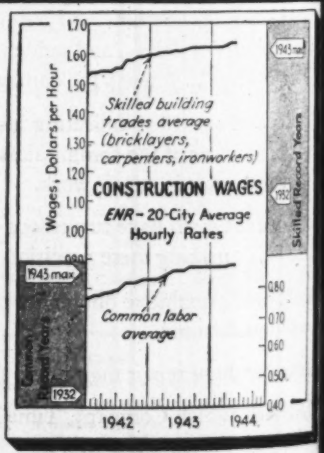
PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD Per 100 lb. in. 600-lb. (Approx.) bbl. Dry a	WHITE LEAD Per 100 lb. in oil	READY-MIXED PAINT Per gal., drums Graphite b	Aluminum b	Ferric Oxide d	ROOFING SUPPLIES Carload lots f.o.b. factory Rolls, slate surfaced, 85-90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 350 lb. bbl. per ton
Atlanta	$10.25	$14.125	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	10.00	13.75	2.00	3.00	2.50	2.30	2.70	2.70	.40	29.00
Birmingham	10.25	14.125	2.35	3.50r	1.98r	2.04	1.97	1.97	.32	28.35
Boston	10.00	13.75	1.65	2.50	2.30	2.00‡	2.00‡	2.00‡	.50‡	21.00‡
Chicago	10.00	13.75	....	....	....	1.75kf	1.74kf	1.82kf	.33f	23.00f
Cincinnati	10.00	13.75	1.70	2.90	1.60	2.40	2.39k	2.39k	.36	21.00
Cleveland	10.00	13.75	1.70	2.90	1.60	1.93	1.83k	1.83k	.35	29.00
Dallas	10.00	14.50	1.88	2.11n	.05l	1.75k	1.66k	1.66k	.35	39.00
Denver	10.50	14.25	....	....	.27l	2.45	2.95	2.95	.35	28.00
Detroit	10.00	13.75	1.75	3.00	1.60	2.25	2.25	2.25	.50	23.00
Kansas City	10.00	13.875	2.39g	2.55gr	2.16g	2.10	2.30	2.30	.28	27.50
Los Angeles	10.25	14.25	1.60	2.25	2.30	2.10	1.50	....	.45	.....
Minneapolis	10.00	13.875	....	....	....	1.75i	1.66Ai	1.66Ai	.32	23.00
Montreal	9.25	6.25	2.50p	4.90p	3.15p	4.02t	2.58t	3.01t	.89t	2.10m
New York	10.00	13.75	2.03	....r	1.82	1.66	1.58k	1.58k	.26	25.00
Philadelphia	10.00	13.75	1.60/1.80	2.20r	1.55	1.75	1.66	1.66	.32	23.00
Pittsburgh	10.00	13.75	1.05	1.95	.80	1.95	1.94k	1.94k	.34	26.00
St. Louis	10.00	13.75	2.28s	2.89s	1.96s	1.66	1.66	1.66	.28	23.00
San Francisco	10.25	14.00	1.80	2.75n	1.35	1.71	2.40	2.40	.33	20.50
Seattle	10.25	14.25	1.90	3.00	....	2.15	2.16k	....	.35	26.80f

‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. a Red lead prices change frequently due to pig lead price changes. b U. S. War Dept. Spec. 3-49A. c ASTM Spec. D266-31. d 80% minimum ferric oxide. e Subject to 25% discount. f Distributors' price to contractors. g 5 gal. can. k Per roll, 65 lb. i Minneapolis and vicinity. j Asphalt pitch. k Per 100 l Per lb. m Per bbl. n May, 1941 price, no later quotation available. p Pl 8% sales tax. r Not available, except on priority rating; then quoted special s December, 1942 price. t Federal tax included.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor Building	Common Labor Heavy Const.
Atlanta	$1.50	$1.25	$1.50	$1.25	$1.50	$0.40	$0.50
Baltimore	1.75	1.375	1.80	1.625/1.80	1.50	.75	.75
Birmingham	1.75	1.25	1.50	1.25/1.50	1.50	.65	.65
Boston	1.625	1.50	1.65	1.875	1.667	.80/1.00	.80/1.00
Chicago	1.75	1.70	1.76	1.75	1.825	1.10	1.10
Cincinnati	1.75	1.50	1.675	1.45/1.60	1.625	.85	.85
Cleveland	1.875c	1.575	1.875	1.875	1.875	1.085	1.15/1.25
Dallas	1.625	1.25	1.50	1.75	1.625	.60	.75/1.25
Denver	1.65b	1.50b	1.50b	1.50/1.625b	1.50bf	.80b	.80b
Detroit	1.725df	1.50	1.75	1.675/1.75df	1.725df	.90	.75/.90df
Kansas City	1.65	1.50	1.625	1.625	1.65	.90	.90
Los Angeles	1.50	1.35	1.625	1.375	1.667	.875	.875
Minneapolis	1.50	1.375	1.50	1.40	1.50e	.925	.925
New Orleans	1.50	1.25	1.50	1.50	1.375	.65	.75
New York	2.00b	1.85b	2.00	2.00b	2.00b	1.10f	.95
Philadelphia	2.00f	1.58f	2.00f	2.00	2.00	.825	.825
Pittsburgh	1.90	1.75	1.75	1.8125	1.875	.90	.80
St. Louis	1.75	1.50	1.75	2.00	1.75	.95	.95
San Francisco	1.875	1.50	1.75	1.50/1.75	1.75	1.00f	1.00f
Seattle	1.845f	1.565f	1.745f	2.00	1.865f	1.145f	1.10
Montreal*	1.05	.95	1.00	.90	.96	.52	.65



b 7 hr. day. c Prevailing rate on government work. d Rates effective Mar. 1, 1944. e 35 hr. wk. f Rate change in Detroit, Philadelphia, New York and Seattle approved by W.L.B. * Cost of living bonus now included in basic wage.

ENR Skilled Average: (Bricklayers, Carpenters, Ironworkers) $1.6
ENR Common Average: $0.874

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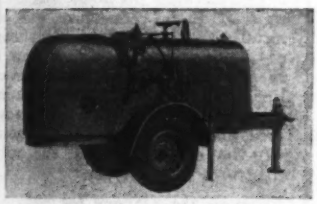

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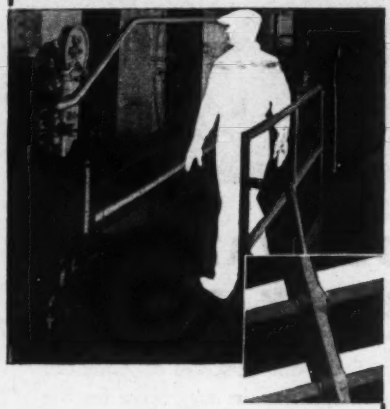

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Reports and Pamphlets

(*Continued from page* 112)

A LONG-RANGE PROGRAM OF PUBLIC IMPROVEMENTS, Moultrie, Ga. Aug. 1942.

THE TRANSPORTATION PROBLEM—Transportation Association of America, Chicago.

A REVIEW OF RAILWAY OPERATIONS IN 1943—By Julius H. Parmelee. Association of American Railroads, Bureau of Railway Economics, Washington, D. C.

ELECTRICAL TECHNOLOGY AND THE PUBLIC INTEREST—By Frank Joseph Kottke. American Council on Public Affairs, Washington, D. C. Cloth Edition $3 Paper Edition $2.50.

PROCEEDINGS—23rd Annual Meeting of the National Council of State Boards of Engineering Examiners. P.O. Drawer 1404, Columbia, S. C. $2.50.

EFFECTIVENESS OF WOOD PRESERVATIVES IN PREVENTING ATTACK BY TERMITES—Circular No. 683. U. S. Department of Agriculture. Superintendent of Documents, Washington, D. C. 10c.

THE SECOND MILES: A RE-SURVEY, 1944—By W. E. Wiskenden. Engineers' Council for Professional Development, 33 W. 39th St., New York. 10c.

A SOUND PLAN FOR POST-WAR ROADS AND JOBS—Senate Committee Print, 78th Congress, 2nd Session, Superintendent of Documents, Washington, D. C.

A SYSTEM FOR URBAN REDEVELOPMENT WITHOUT SUBSIDY—By Alfred Rheinstein. New York Building Congress, Inc., 101 Park Ave., New York 17, N. Y.

NATIONAL RESEARCH COUNCIL—Part I—Reports and Papers General Assemblies and Sections of Geodesy, Seismology, Meteorology, Terrestrial Magnetism and Electricity, Oceanography, Volcanology, and Tectonophysics. Part II—Reports and Papers Section of Hydrology. Part III—Reports and Papers Joint Regional Meeting, Section of Hydrology, Western Snow Conference Corvallis, Oregon. Published by the National Research Council of the National Academy of Sciences, Washington, D. C.

GUIDE TO WELDABILITYOF STEELS—American Welding Society, 33 West 39th St., New York 18, N. Y. $1.

WATERWORKS ENGINEERING IN DISASTER—OCD Publication 2022. Office of Civilian Defense, Washington 25, D. C.

MASONRY—American Standard Building Requirements A41.1-1944. American Standards Association, 29 West 39th St., New York 18, N. Y. 50c.

PROCEEDINGS of the 4th Annual Water Conference of the Engineers Society of Western Pennsylvania. Obtainable from the society, William Penn Hotel, Pittsburgh, Pa. $3.15.

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In answer to a direct question on what his Buckeye Spreader had saved him over previous methods of spreading, one contractor wrote, "Quite a few thousand dollars."* Other users made the comments listed at the right.

Accuracy is the keynote behind Buckeye Spreader success. A spirally fluted, transmission-driven, adjustable speed feed roll grips the material and distributes it positively through a measured gate opening. This insures a "metered" flow that spreads material within a variation from calculated volume of as little as 1% to 3% on many jobs. The Buckeye Spreader is far more than a truck tailgate attachment — it is a *Spreading machine* from the ground up. Complete data in 8 PAGE BULLETIN. Write for copy.

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"Save 30 to 50% on materials."	"Saves approx. $25.00 per mile."
"This is the best spreader I ever used."	"Saves at least 20% on material."
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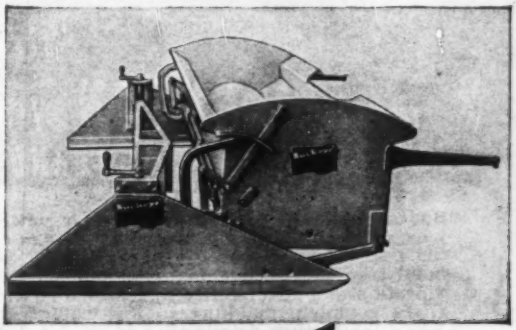
STRIKE-OFF ATTACHMENT

This attachment permits spreading base coarses to 6 inches depth. Blade is mounted on skids and is adjustable by hand cranks.



Convertible Shovels
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CEMENT GUN COMPANY
"GUNITE" CONTRACTORS
GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.

MADE BETTER THAN NEW WITH "GUNITE"

Almost a new building for an old one, a la Aladdin, is this "GUNITE" job we did in 1920, upon the factory building of the New Departure Manufacturing Company, Meriden, Conn. The badly eroded brick work was cleaned, chipped, washed down and ¾" of "GUNITE" applied directly to the walls without reinforcing. Today, this building is in splendid condition.

Our Bulletin 2200 described various cases of structural restoration and protection, as well as new work and many other uses for "GUNITE." Write for a copy.

MANUFACTURERS OF THE "CEMENT GUN"

BIG JOBS AHEAD

for YOU...
with JACKSON VIBRATORY HAND SCREED!

But before you tackle the big Post-War concrete contracting jobs, get acquainted with the wide scope in concrete surfacing operations offered by the JACKSON SC-4A vibratory hand screed. Its advantages include lightweight, uniform vibration and adaptability to reasonable widths of section. Gives complete puddling to low-water content concrete. Write for further details.

ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON MICHIGAN

MANUFACTURERS' ACTIVITIES

E. W. Meyers

At the recent annual meeting the Pittsbu Equitable ter Co., C nel Willard Rockwell elected ch man of board. C nel Rockw who has be president the compa since 19 will contin as active he of the firm and serve in the dual cap ity of president and board chairm

Subsequently announced were elections of Edgar W. Meyers as director and William S. Potter as vice president.

W. S. Potter

Mr. Meyers, treasurer for the past 18 years, will continue to serve in that position.

Mr. Potter formerly was assistant works manag He has been connected with the Pit burgh concern for the past 14 years various engineering and production c pacities.

ROBERT P. GILRAY, chief engineer the Duluth-Superior Dredging Co. d in Marysville, Mich. recently. Mr. G ray, born in 1888 at Sault Ste. Mar Mich., worked for the Pittsburgh Stea ship Co., the United States Salva Association and the Hartford Ste Boiler Inspection and Insurance C as well as many years for the Dulu Superior Dredging Co.

MANUFACTURING and sales rights Hercules road roller and ironeroller previously made and sold by T Hercules Co. of Marion, Ohio, ha been acquired by W. A. Riddell Co

GEORGE W. WICK has been elect president of the Fort Pitt Bridge Work He was formerly executive vice-pre dent and succeeds James M. Straw who was elected vice-president in char of production and costs.

TWIN-RIBBON
Concrete Spreading
• Koehring Paver stability permits practically right angle pouring. Bucket can travel to end of boom for maximum spreading area.

CUT BATCH CYCLE TIME...

Koehring Pavers, Twinbatch and Unibatch, have the special fast spreading Twin-Door boom bucket. Twin doors, both opening same direction, provide Double-Quick Dumping and Spreading. Twin ribbons of concrete are spread on the grade. Action is instantaneous . . . large Twin-door opening is approximately 13 square feet. Full width of bottom is used for door opening. No choking at bucket doors with dry or harsh concrete. Bucket shaking is not necessary. Seconds saved when dumping and spreading cut batch cycle time.

DEPEND ON YOUR KOEHRING DISTRIBUTOR to help you keep your equipment operating. Care for your Koehring equipment *NOW*, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.

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WILL BE AN URGENT POSTWAR NEED

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Summing it up, you are going to demand the very features that have made Layne Water Systems world famous. But you are not going to buy on reputation alone. You are going to ask for a lot of bed-rock facts and figures. You will want to know exactly what you are getting for your dollars.

Fortunately, you are going to be the very kind of prospect that Layne likes to meet—the kind of buyer that will understand and fully appreciate the incomparably fine features found only in Layne Turbine Pumps and Water Systems. You are going to be a dandy postwar customer, and like hundreds of other "look before you leap" buyers, you are going to be a 100 percent satisfied Layne customer.

For literature and further facts, address Layne & Bowler, Inc., General Offices, Memphis (8), Tenn.

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LAYNE

WELL WATER SYSTEMS
DEEP WELL PUMPS

BUILDERS OF WELL WATER SYSTEMS FOR INDUSTRIES AND MUNICIPALITIES

of Bucyrus, Ohio. The new owners will operate as The Hercules Roller Co.

The Riddell organization plans to produce Hercules rollers and announces that Carl G. A. Schmidt, Jr., manager of sales for the Hercules Co., has joined Riddell in the same capacity.

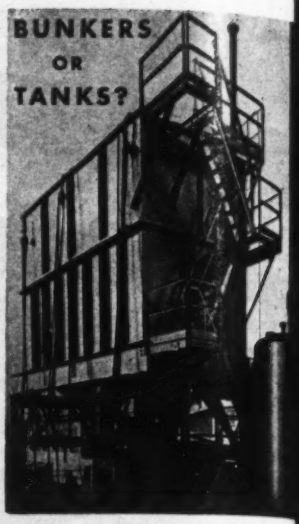
The Hercules Roller Co. will supply replacement parts for Hercules rollers and expects to continue the distribution of the rollers through most of the group of distributors, at home and abroad, established by Mr. Schmidt, as well as through many Warco distributors.

THE BALDWIN LOCOMOTIVE WORKS has opened a district sales office at 2929 Nineteenth Street, San Francisco, Calif., in charge of Ray S. Quick, also general manager of The Pelton Water Wheel Co. The office will handle sales of the locomotive and ordnance, Baldwin Southwark, Cramp Brass and Iron Foundries and Standard Steel Works divisions, also the Baldwin De La Vergne Sales Corporation and The Pelton Water Wheel Co. The San Francisco office will direct sales in Alaska and Hawaii.

Mr. Quick was graduated from the University of California in 1916 and from the University of Illinois in 1919, with degrees in electrical engineering. In 1917-1919 he served in the United States Army as second lieutenant in the Signal Corps. After the war Mr. Quick was employed by The Pelton Water Wheel Co. serving as sales engineer, executive engineer, chief engineer, and general manager. He has been active in the hydraulic division of the American Society of Mechanical Engineers, especially in connection with research on water hammer and related subjects.

FRANK V. WIDGER, manager of the asphalt sales department of The Texas Co., is the newly elected chairman of the executive committee of The Asphalt Institute. In this added connection he is the coordinating head of the engineering and research activities of this national association of producers of the petroleum asphalt industry.

Born in Churchville, N. Y., educated in Michigan, Mr. Widger, after an earlier business career in the copper



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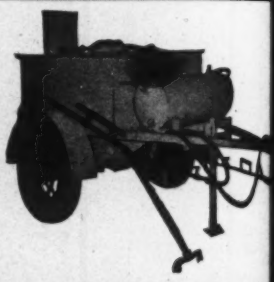
Lancaster, Pa.



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Twenty-two REASONS
Why *FLEX-PLANE* Dummy Joints are Necessary in Modern Concrete Pavements

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- Relieves Stress
- Lessens Bumps
- Minimizes Pumping
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- Lessens Deterioration
- Lowest Cost
- Limits Maintenance Cost
- Anchored in Place — Is Permanent
- No Extrusion
- Localizes Expansion and Contraction
- Assists in Normalizing the Slabs
- Ribbon Joint is Continuous in Length
- Prevents Infiltration of Water
- Increases Strength of Slabs
- Produces Homogenous Structure
- Provides Expansion Relief for the Hot Upper Part of the Slab

FLEX-PLANE joint installing machines eliminate messy hand methods. Install all types of joints . . . ribbon, poured, premoulded, etc., with or without VIBRATION.

• *Ask for Equipment Specifications* •

FLEXIBLE ROAD JOINT MACHINE CO. WARREN, OHIO U. S. A.

and coal-mining industries, joined asphalt sales Department of The Co. at Chicago in 1913.

He served as manager of the Ch district of that company from 19 1937, when he was transferred to York and made manager of the a sales department, his present po Mr. Widger lives at Lynbrook, N.

At an organization meeting of B Meter Co., Cleveland, directors recently. E. G. Bailey, former dent and company founder was e Chairman. Robert S. Coffin suc him as president.

Mr. Coffin, who has been vice dent since 1925, became identified Bailey Meter Co. as treasurer a time of its organization in 1916.

Other officers elected at this m are, R. E. Woolley, vice president has served in that capacity since and J. H. Black, secretary-treasur

ANNOUNCEMENT has been ma the H. O. Penn Machinery Co., York City of the appointment of Russell W. Long as manager of the Mineola, L. I. branch office and service shops. Mr. Long has been sales representative of the company for the past seven years and is well known throughout New J where he has been concentratin efforts. He is filling the vacanc by Jack Frost, who has been in c of the Mineola branch since its lishment, but who recently purc the controlling interest in the Mic Tractor & Machinery Co., of Detro Grand Rapids, Mich.

A CONTRACT has been signed wh the Monsanto Chemical Co. ac I. F. Laucks, Inc., of Seattle, leading producer of plywood Monsanto obtains the two Laucks

WILLIAMS *Buckets*

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All types and capacities for all conditions. Send for Catalog.

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OPEN STEEL FLOOR

Pressure Formed

90% Open Area

Easy to Install

Hendrick Manufacturing Comp

49 Dundaff Street, Carbondale, Pa.

...attle and other interests at Van-
...r, B. C., Los Angeles, Calif., Ports-
...h, Va., Lockport, N. Y., Stonbridge,
... and interests which Laucks held
...ustralian and Swedish companies.

...LIAM P. NEWMAN, purchasing
... of Robins Conveyors, Inc., manu-
...rers of mate-
...handling ma-
...ry, was hon-
...on his recent
... anniversary.
...nt were 16
...ns who had
... a total of 400
... with the
...any. Besides
... Newman,
... who had seen
...more years of service were Thomas
...s (53 years), W. R. Browne (39
...), E. S. Stadelman (36 years),
...rs. E. C. Salzman, R. W. Eichen-
...r and T. M. Keith (34 years each)
...Thomas Matchett (31 years).
... Newman started as office boy
...having served similarly for Thos.
...dison. He has been purchasing
... for 36 years. Mr. Newman was
... a watch inscribed: "Robins Con-
..., Inc. to Wm. P. Newman—45
... of Loyalty, Integrity and Honor."

...RNATIONAL HARVESTER CO. has
...nced the creation of a separate
... truck division for design, produc-
...and distribution of International
... P. V. Moulder, former assistant
... second vice president, has been
...nted general manager of the new
...on, covering the motor truck fac-
... at Ft. Wayne and Indianapolis,
... and Springfield, O.; the motor
... engineering department at Ft.
...e; and all exclusive motor truck
... operations in the United States.
... divisional executive staff will be:
...ger of engineering, W. D. Reese;
...facturing, V. A. Guebard; supply
...ventory, D. A. Conroy; sales, W.
...humacher; and divisional comp-
..., Glenn D. Wade.
...ulder, with the company over 33
... became as-
... sales man-
...f the eastern
...t in 1935.
...as appointed
...er of motor
... sales in
... In 1940 he
... named as-
...t domestic
...a manager,
...ming to di-

...otor truck sales, and in 1942, he
...ppointed assistant to the second
...resident. He is a director, Auto-
... Council for War Production.

GREAT GUNS!

. . . powered by a MORRIS Pump

This hydraulic giant is "caving down" a bank of dense, hard, clayey material through the pressure developed by a MORRIS Centrifugal Pump.

The particular MORRIS pump application illustrated above happens to be an unusually spectacular illustration . . . but thousands upon thousands of other MORRIS Pumps are undramatically, yet faithfully and effectively, performing their task of handling liquids and materials of every kind.

For 80 years, MORRIS has specialized on the "hard-to-handle" services . . . the kind of jobs for which other designs do not have sufficient stamina, capacity, or efficiency. If you have a difficult pumping problem, don't give it up . . . instead, give it to the MORRIS engineers. Write for bulletins on MORRIS Pumps for services in which you are interested.

Heavy-Duty Material Handling Pump

Double Suction Horizontally Split Pump for Clear Liquids

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MORRIS ESTABLISHED 1864

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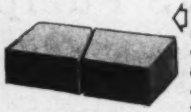
CENTRIFUGAL PUMPS

FASTER CUTTING
...with
Clipper Masonry Saws

Your Special Size and Shape Brick or Tile can now be "Tailor-Made" at a moment's notice!

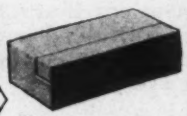
The new Clipper Multiple Cutting Principle makes possible faster cutting of every masonry material regardless of hardness.

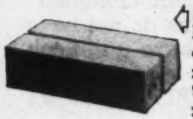
Here are a few typical examples of the speed and accuracy with which fire brick can be cut for furnace repairs.



This acid brick intended for a chemical plant acid chamber was cut completely in two, in 37 sec.

One of many intricate cuts performed on first quality clay brick for heat treating furnaces. Made in 8 seconds.





Silica brick cut lengthwise for open hearth furnace work, only 9 seconds were required to complete this cut!

Basic refractories for steel furnaces or cement kilns must be accurately installed. This magnesite brick was cut in 12 seconds!

Clipper Saws are available for trial. Write for Descriptive Catalogs.

THE Clipper MANUFACTURING COMPANY

4016 MANCHESTER
ST. LOUIS, MISSOURI

Engineering Projects—A small folder outlines this company's activities during the past few years. It also illustrates some major projects of various types in the United States, several countries in South America and the West Indies. These pamphlets in English and Spanish will be sent to government officials, agencies and organizations interested and where the organization would be of service.—*Frederick Snare Corp., 114 Liberty St., New York, N. Y.*

Merchandising and Manufacturing Policies—A couple of unusually effective rotogravure booklets have been issued by this manufacturer: "Policy or Habit?" outlining the policies responsible for the company's success; and "Threshold to the Future," giving a glimpse into the research and test laboratory where diesel engines for tomorrow are being developed.—*Cummins Engine Co., Columbus, Ind.*

Automatic Dump Cars—Rolling trunnion automatic air dump cars, for which the manufacturer claims easy, positive, fast dumping action under all conditions, is described in a new catalog.—*Pressed Steel Car Co., Inc., Industrial Division, Pittsburgh, Pa.*

Cradle and Rocker Cars—Three new technical bulletins recently issued describe the cradle and rocker, self-discharge, square box dump and quarry cars developed especially for mines, quarries and contractors, as well as for industrial plants.—*Pressed Steel Car Co., Inc., Industrial Division, Pittsburgh, Pa.*

Highway Maintenance—Because of the war, highway construction has been greatly restricted. Maintenance has not only the responsibility of sustaining wartime traffic but also of preventing deterioration from reaching such a point that reconstruction will be difficult after peace comes.

A new bulletin points out how calcium chloride can be used from the subsoil to the surface in maintenance operations to obtain lasting benefits.

Post-hole treatment of frost heaving areas is proposed as a corrective treatment for subgrades. Addition of stabilized aggregates is advocated for the

When There's No Time for Brecke... It's Time to Get a Gorman-Rupp P...

Today, when time is the essence, you need a Co... Rupp Self-Priming Centrifugal Pump more than ... There is not a quitter among them. The water p... has the same area as the suction hose. Muck, g... cinders—you simply can't clog them because solid... not accumulate. There is no recirculation orifice t... —no shut-off valve to jam—no hand priming req... There isn't a self-priming centrifugal pump made... will outwork a Gorman-Rupp in gallonage or cont... hours. Gas engine or electric motor driven. Capacit... to 120,000 GPH. There is a type and style to fit ... every requirement. Stocked for immediate delivery i... principal cities.

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GORMAN-RUPP
Self-Priming Centrifugal Pump

BUILT TO HANG ON

BECAUSE they have a special grip, Electroline-Fiege Wire Rope Connectors "hang on" under all conditions. The bite is tapered from rear to front. That dampens vibrations, thus preventing crystallization and fraying, gives you a positive connection and added rope life.

Electroline-Fiege connectors are safe (no molten metals to injure workmen or weaken wire rope.) streamlined, easy to install and economical. There are styles and sizes to fit every need. Write today for the interesting booklet, "Positive Grip". It is full of useful data.

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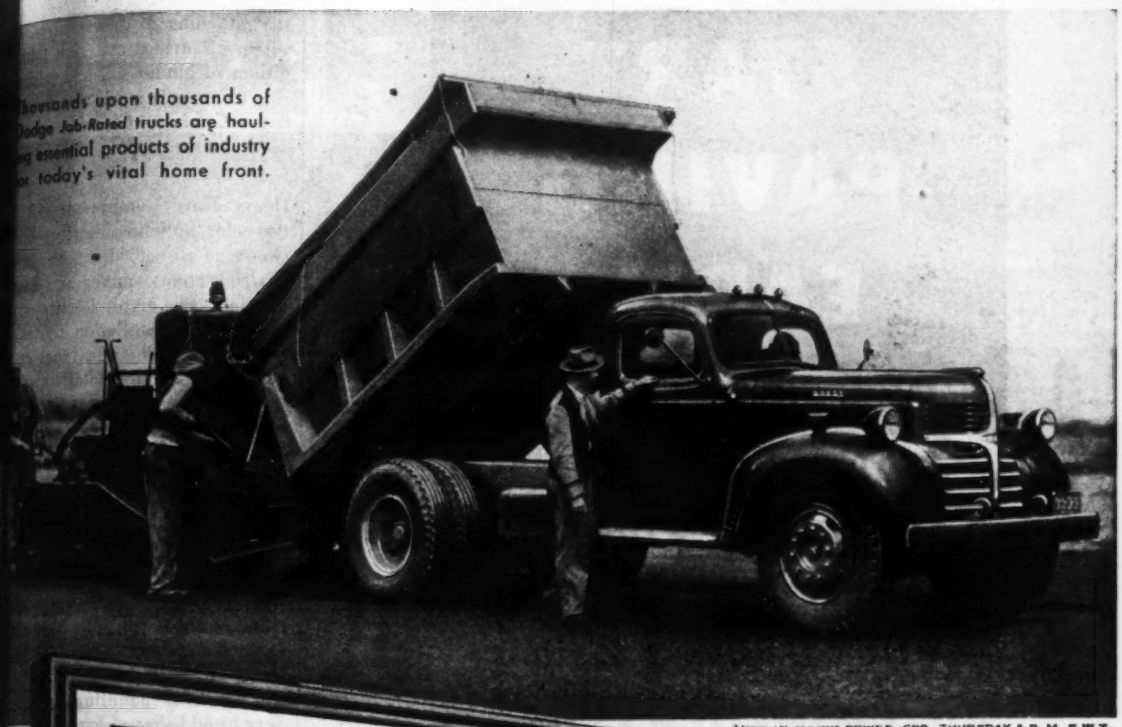

TUNE IN MAJOR BOWES, CBS, THURSDAY 9 P. M. E.W.T.

BUY WAR BONDS

MILE AFTER MILE AFTER MILE

WITH DODGE DEPENDABILITY

While more than 300,000 Dodge-built Army trucks are serving our fighting forces, Dodge *Job-Rated* trucks, like the one pictured, are doing a great home-front job. On essential hauling jobs, they're piling up *mile* after *mile* after *mile* of dependable transportation—proving beyond doubt that "it's a *long way* . . . to the *last mile* . . . of a dependable Dodge!"

DODGE DIVISION OF CHRYSLER CORPORATION

DODGE *Job Rated* TRUCKS

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0,000 TRUCKS, AND THEIR MILLIONS OF DRIVERS, ARE SERVING AMERICA'S VITAL HOME FRONT!

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EARLY...

Make best use of available

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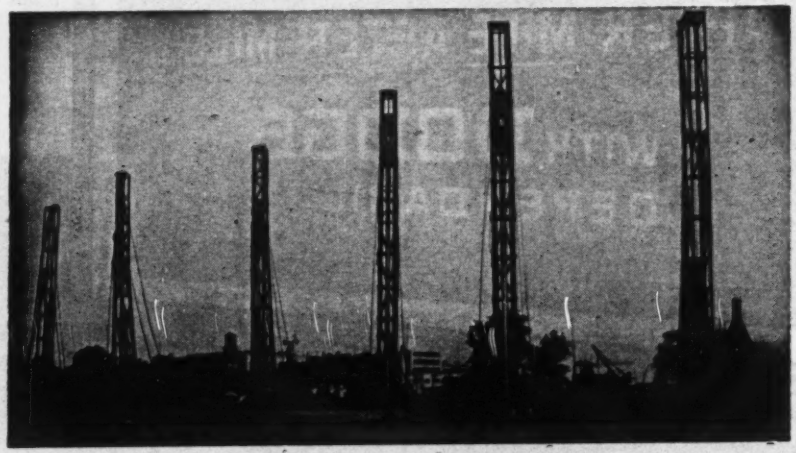
WITH STANOLIND ASPHALT

KEEP TRAFFIC ROLLING

STANDARD OIL COMPANY
(INDIANA)



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WESTERN CONCRETE PILE CORP.
DRILLED-IN CAISSON CORP.

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CHICAGO, ILL.

52 VANDERBILT AVE.
NEW YORK, N. Y.

strengthening of base courses, C... vation of surface materials throu... ditions of binder soil and calcium... ride treatments is another recomm... tion.—*Calcium Chloride Assoc... 4145 Penobscot Bldg., Detroit 26,...*

Heavy Duty Compressors—A 5... two-color bulletin describes heav... two-stage air-cooled compressors ... dustrial plants, mines and heav... tracting. The amply illustrated b... shows many installations; gives de... tion of available sizes, types and ... and of construction detail; also in... tion as to foundation require... regulation, accessories and servic... *Sullivan Machinery Co., Michig... Ind.*

Riggers' Handbook—When to ... the different types of slings, wh... working loads are, where to lo... wear, how to measure—these ... mentals are outlined in this new ... book. In the section devoted to h... safety slings it shows how their fl... ity simplifies handling awkward, ... pery or odd-shaped loads. The pat... braiding of this non-kinking type ... mits a soft, sure-gripping sling w... surplus weight or bulk.—*Broderi... Bascom Rope Co., 4203 N. Union ... St. Louis 15, Mo.*

Hydraulic Torque Converters—... concerning the function, operation ... installation of hydraulic torque ... verters are presented in a 16... booklet. This material will help ... chine designers, manufacturers ... users to gain a clearer understa... of this method of gaining mecha... advantage between driving and ... units.

Several models are described ... photographs and drawings. Install... data makes this booklet valuab... planning initial layouts and in dr... up preliminary specifications for ... ment on which torque converters ... be used.—*Twin Disc Clutch Co., ... draulic Division, Rockford, Ill.*

Heavy Equipment Operating—A ... book is available to owners, ope... and mechanics using this ma... turer's equipment. Reading it ... prevent breakdowns caused by l... information and improper equi... care and operation.—*Euclid Roa... chinery Co., Cleveland 17, Ohio.*

Care of Motomixers—This bookl... help truck mixer users to keep ... existing equipment at peak effic... It covers cleaning, oiling, water co... operating hints, and general m... nance and repair.—*Chain Belt ... 1600 West Bruce St., Milwaukee...*

PARSONS

When desired a conveyor extension may be added to facilitate loading higher trucks or keep spoil bank farther from trench.

QUICK SHIFT CONVEYOR

The arc type discharge conveyor on a Parsons Trencher shifts through the machine by power so that spoil may be deposited on either side of trench as desired by the operator. This shift may be made in less than fifteen (15) seconds so that an obstruction can be cleared while machine is digging—a most important feature when operating in close quarters. The shift is by worm and worm gear which automatically locks conveyor in any position.

The conveyor is permanently located for height and does not vary when boom is raised or lowered. Trucks may, therefore, be loaded at fixed position discharge height.

The spoil to be retained for backfill is piled on opposite side of trench by merely moving a lever to reverse the direction of belt. Investigate Parsons superiority before you buy.

PARSONS COMPANY
NEWTON, IOWA

TRENCHING EQUIPMENT

PARSONS

PPINGER AND RUSSELL CO.
Wood Preservers Since 1878
kinds of Structural Timbers and Lumber Pressure Treated with Creosote Oil or
DU PONT CZC Chromated Zinc Chloride
EIGHTH AVE., NEW YORK, N. Y.
OLES, CROSS ARMS, PILING, TIES OSTS, BRIDGE AND DOCK TIMBERS
TREATING PLANTS
Jacksonville, Fla. Norfolk, Va.
Long Island City, N. Y.

Fast, Dependable
SHOVELS, CRANES
DRAGLINES, BACK HOES
Crawler or Truck—Gas or Diesel
10 Models of 3/4-5/8-1/2-3/8 cu. yd.
THE BYERS MACHINE COMPANY
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

DELAWARE BAY
SHIPBUILDING CO., INC.
LEESBURG, NEW JERSEY
BULKHEADS
PILEDRIVING
WHARF CONSTRUCTION
MARINE RAILWAYS

on ROGERS TRAILERS

GETTING there "fustest with the mostest" as one early American General aptly phrased it, is battle strategy that really conquers!

In the lightning speed of mechanized warfare tanks ride "Pick-A-Back" to battle on ROGERS TRAILERS so their fighting capacity is unimpaired. Special ROGERS TRAILERS retreive disabled tanks so they can be repaired and rushed into battle again.

EXPERIENCE *builds 'em*
PERFORMANCE *sells 'em*

ROGERS TRAILERS are doing a real war job at home and abroad. New models which will be available to industry when war contracts are completed will be even better-engineered and more efficient than their predecessors.

ROGERS BROS. CORPORATION
ALBION,
PENNA.

PIPE ACCORDING TO THE A. S. A. LAW OF DESIGN

Mono-Cast Centrifugal Pipe can be manufactured in specific weights for specific laying conditions, and in accordance with the recently adopted A.S.A. Law of Design. You get the exact pipe your conditions call for.

PROMPT DELIVERIES with suitable priorities.

AMERICAN CAST IRON PIPE COMPANY

Birmingham 2, Alabama

Sales Offices in Principal Cities

MEN AND JOBS

(*Continued from page 72*)

Lt. Col. George R. Schneider, of the U. S. Engineers, has been appointed acting district engineer for the Little Rock district. He succeeds **Col. A. M. Neilson,** district engineer since April, 1942, who has been ordered overseas.

Kenneth Hoopes of Miami, Ariz., has been appointed a member of the Arizona Highway Commission to fill the unexpired term of E. H. McEachren, Miami, who resigned. Mr. Hoopes operates a lime quarry and was formerly with the highway department.

Ray N. Wheelock, who for the past two years has been resident engineer and plant manager for the Missouri Ordnance works, has been named project engineer of the Sunflower Ordnance works for the Hercules Powder Co. at De Sota, Kan.

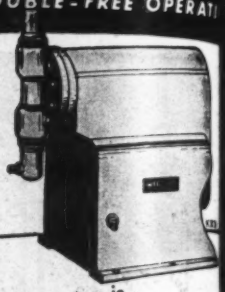
John S. Bell, former Texas State Department of Health sanitary engineer at Sweetwater, has been made State Health Department district sanitary engineer for 29 Texas counties with headquarters at Forth Worth.

Merritt O. Clinton, civil engineer with the A. E. McMahon Engineering Co. of Menasha, Wis., has been appointed city engineer of Menasha succeeding the late A. E. McMahon. Mr. Clinton is also a member of the Menasha water and light commission and likewise of the Menasha-Neenah sewerage commission.

Edward J. Stephan of Dousman, Wis., has been elected highway commissioner of Waukesha county, succeeding Harry J. Burton, who resigned after serving since 1933. Mr. Stephan has been connected with the highway department for 20 years.

Pickell and Pickell announce the reopening of their engineering offices in Greenville, S. C. For a number of years they were in Greenwood, and at the outbreak of the war they offered their engineering personnel to the War Department as civilian and military officers. The new offices will be under the direction of **Walter L. Pickell, Jr.,** while his brother, **Capt. Heyward M. Pickell** is still in military service. Walter Pickell while in government service was chief designing engineer for one of the Army's largest air fields. The firm is in industrial, municipal and sanitary engineering, specializing in industrial building insulation.

... for ACCURACY & TROUBLE-FREE OPERATI



in WATER & SEWAGE TREATMEN and in CHEMICAL PROPORTIONING for Processing Industries.

Insist on the

WILSON PULSAFEEDER

Literature on Request

Engineered and Manufactured by

WILSO CHEMICAL FEEDERS,

213 CLINTON ST. • EST. 1923 • BUFFALO

Compact! Powerful!

DISTRIBUTABLE CONTR POW

with

ALL STEEL HAND HOIST

SEATTLE, U.S.A.

Money Has Been Saved on Thes

1200' assembled pipe (132 Tons) were l to bed of Mississippi at St. Paul with Beebes, three lines to each hoist blocks.

Hudson River Bridge sidewalks were l sections with 32—5-Ton Beebes.

Longest wooden trusses in world we stalled with ONE 5-Ton Beebe after hoists proved impractical.

★

When raising, lowering, or placing cast are a serious problem, the answer is number of Beebe Bros. All Steel Han MANNED IN UNISON. Available in 2, Ton sizes. Sold through leading dealer trade centers. List of dealers sent upon

BEEBE BROS., 2720 6th Ave. S., Seattle

★

"THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE W

MEETINGS

CAN SHORE AND BEACH PRESERVA- ASSOCIATION, special meeting, House, Chicago, Ill., May 31- L.

CAN WATER WORKS ASSOCIATION, conference, Milwaukee Audito- Milwaukee, Wis., June 13-16.

TY FOR THE PROMOTION OF ENGI- G EDUCATION, 52nd annual meet- Cincinnati, Ohio, June 22-25.

CAN SOCIETY FOR TESTING MATE- 47th annual meeting, Waldorf- Hotel, New York, N. Y., June

CAN SOCIETY OF CIVIL ENGINEERS, meeting, Hotel Cleveland, Cleve- Ohio, July 19-21.

NAL AND LOCAL MEETINGS

EASTERN SECTION, AMERICAN WORKS ASSOCIATION, 1944 g, Greenville, S. C., May 8-10.

JERSEY SECTION, AMERICAN WATER S ASSOCIATION, Trenton, N. J., 1.

RSITY OF TENNESSEE, annual high- onference, University of Tennes- Knoxville, Tenn., May 12-13.

ENGLAND SEWAGE WORKS ASSOCIA- spring meeting, Hotel Kimball, field, Mass., May 17.

TY FOR EXPERIMENTAL STRESS AN- , The Hotel Statler, Boston, May 18-20.

DRILLING
ANYWHERE

We look into the earth

ENNSYLVANIA
RILLING COMPANY
PITTSBURGH, PA.

Manganese Steel Dredge Pumps In T.V.A. Wartime Projects

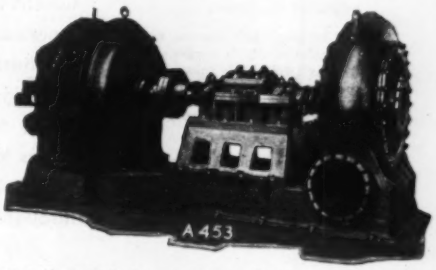
Tennessee Valley Authority's dual war assignment has been to supply additional electric power and to increase aluminum output from its territory.

New dams were rushed to completion to provide deep lakes of impounded water; literally reservoirs of power. For the Apalachia and Ocoee dams, the Birmingham Slag Company of Birmingham, Ala., was the principal supplier of concrete aggregates, a large proportion of which was sand and gravel from the bed of the Tennessee River.

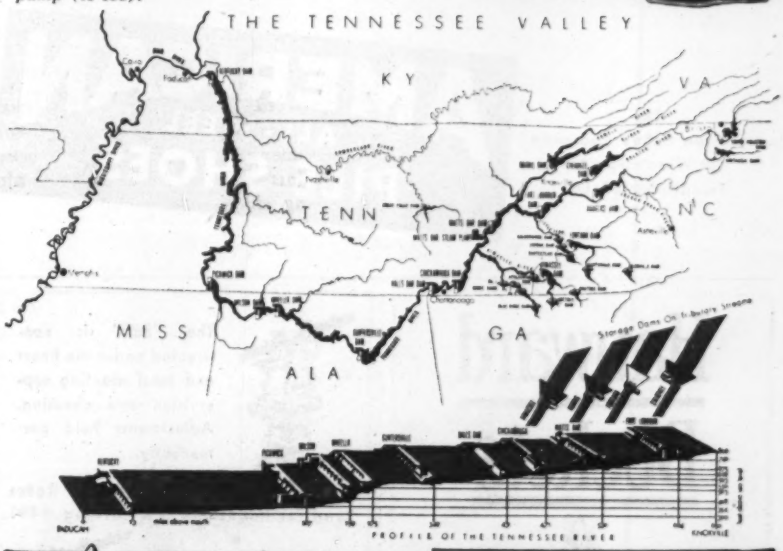
They had two hydraulic dredges on this project. One unit was primarily assigned to excavation, with the other as a standby machine to assure uninterrupted production when repairs were required. Both dredges are equipped with rotary cutter ladders for 50-ft. digging, and 15-in. Amsco type H Form 44 heavy duty dredge pumps, powered by 400 h.p. 440 r.p.m. electric motors. All materials were pumped direct to barges which were towed to the screening plant docks. An Amsco pump similar to those employed is pictured (A453).

The company has fulfilled every demand for aggregates on continuous 24-hour operations. The large volume of sharp aggregates handled under high velocity and pressure required dependable pump parts of long wearing life. Impact and abrasion resistant manganese steel, in Amsco water-end castings, played an important role in T.V.A.'s great war task.

Ask for bulletin on Amsco Dredge Pumps, Pipe Fittings and Rotary Cutters.

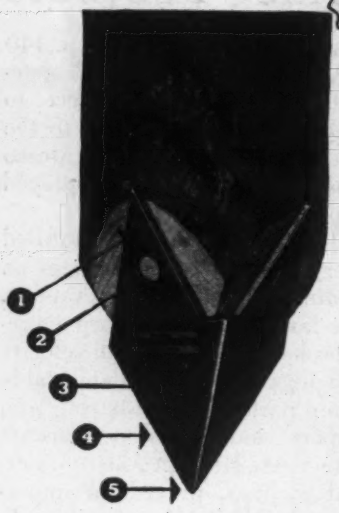


Amsco 15-in. type "H" heavy duty sand and gravel dredge pump (A-453).



Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois
AMERICAN Brake Shoe COMPANY
FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

HOW TO PREVENT "BROOMING" OF PILES...



"Brooming" of a pile is *serious* and may happen when piles are driven *without* pile shoes. The result is an over-size hole and an insecure pile.

The one sure way to PREVENT "brooming" is to use American All-Steel Pile Shoes. In that way, a clean, accurate hole is made, assuring maximum "skin friction"—the grip of the earth on the sides of the pile. And it's the SKIN FRICTION that provides greater load-bearing capacity for your piles.

Construction engineers have found that American All-Steel Pile Shoes make the toughest pile-driving jobs EASY. This specially-designed, rugged shoe is easier to put on; easier to drive; penetrates more rapidly; drives to greater depths; saves man-hours and dollars. Available to you right now, through speedy warehouse delivery!

Check these **5**

AMERICAN FEATURES

1 Nail holes permit easy, fast permanent application.

2 "Bending" hole assures snug fit to sides of slightly smaller piles. "Wings" will quickly take proper contour under a hammer blow.

3 Sides are made of two sturdy ¼" steel shapes.

4 Shoe is assembled by careful welding with coated wire.

5 Sharpened point is produced from solid steel bar stock.

The American Pulley Company
4250 Wissahickon Ave.
Philadelphia 29, Pa.

AMERICAN ALL-STEEL PILE SHOES

MARYLAND-DELAWARE WATER AND ERAGE ASSOCIATION, 18th annual ence, Lord Baltimore Hotel, Balti Md., May 19-20.

CENTRAL STATES SEWAGE WORKS CIATION, annual convention, Osh Wis., June 22-24.

Elections and Activities

E. W. Lippert

E. P. Spe

J. L. Hoak

F. H. Carl

Officers recently elected by the ciated General Contractors of Iow Erick W. Lippert, Boone, vice dent; J. Leo Hoak, Des Moines, urer; E. B. Spencer, Waterloo, dent, and F. H. Carlson, Decorah, president.

William T. Dortsch has been e president of the Building Congre Wisconsin. Other new officers in Fred A. Luber, Jr., Peter T. S mann and A. S. Frederickson, presidents; Walter G. Memmler, retary, and Robert J. Lenken, trea

Hayward Buckets

Use this Class "E" Clam Shell Bucket for handling crushed stone, gravel, sand and other bulk materials.

THE HAYWARD CO., 48-50 Church St., N. Y.

The "Buff" is constructed under the finest and most exacting supervision and checking. Adjustments hold permanently.

Rental Transits — Reasonable Rates.
Send for handsome new catalog #491.

BUFF & BUFF INSTITUTE
J. P. Boston, Mass.

The BUFF "X" TELESCOPE has the finest and highest definition and simplest lens system. It is useful when the light is dim.

ERIE

SINGLE STAGE—SIDE SUCTI

CENTRIFUGAL PUMPS

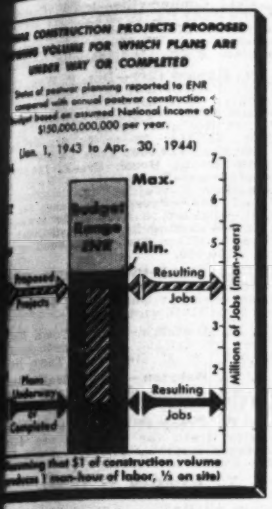
TYPE ENCLOS IMPELL

TYPE OPEN IMPELL

Sizes 1" to 12"

ERIE PUMP & ENGINE WORKS
152 Glenwood Ave., Medina, N. Y.

STWAR PROJECTS



s proposed for postwar construc- ave been published in these col- since January, 1943 as they have reported to ENGINEERING RECORD.
chart above shows, both in esti- dollar volume and in jobs or man- f labor, how fast this reservoir of work is filling up.

WATER SUPPLY

Port Pierce—City, water supply sys. incl. 1 m.g. surface storage tank. Gallespie, Packard Bldg., Jackson- grs.

Gas City—City Council, R. Ray, City Hall, WW sys. $40,000. C. E. City Hall, South Bend, consult.

Athol—Town Bd. Selectmen, Town ater storage reservoir. Over $15,000. Bond, 189 High St., Holyoke, engrs.

Southbridge — Southbridge Water Co., Main St., exten. c.i. watermains, Hill. $50,000.

Grosse Pointe Farms—Village, rks. $100,000. M. M. Smith, Grosse Farms, engr.

Montclair—Town, constructing, in- c.i. watermains. $50,000. M. Gallo- wn Hall, engr.

Saratoga Springs—City, watermain, n St. $19,293. State Aid Planning allotted.

Scarsdale—Village, WW exten., $437,806 State Aid Planning Funds

Oil City — Dpt. Streets & Public s, plans underway WW imprvs. B. Weber, city engr.

—Beaumont-Port Arthur Industrial c/o H. W. Gilbert, P. O. Box 1030, nt, approx. 100 mi. 20 in. c.i. water- etween Beaumont and Port Arthur, to Orange. Over $100,000.

Kerrville—Town, water sys. imprvs.

Lubbock—Town, water supply facili- 70,000.

Mart — Town, water purification imprvs., $70,000. Koch & Fowler, National Life Bldg., Dallas, engrs.

Omaha—Town, WW imprvs. Over Freese & Nichols, 407 Capps Bldg., Forth, engrs.

Paris—Watermains, etc., imprvs. W. Hicks, City Hall, city engr.

Smithville—WW exten. $28,000.

Wichita Falls—City, c/o A. C. es, supt. WW, City Hall, voted bonds, g 25 mi. approx. 20 in. conduit lines, 0; constructing earthen, rein-con. supply retention dam and spillways, 0. CD 4/10.

WERS, WASTE DISPOSAL

Winsted—City, J. W. Darsey, mayor, all, sanitary sewers. $75,000.

Each day's advance toward Tokyo and Berlin sees a quickening of the pace . . . an ever-increasing demand for every man and machine to take it "on the double!"

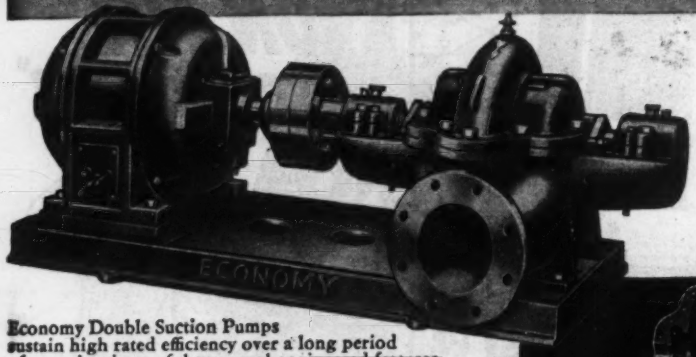
For years now, fast, mobile Insley Excavators have been accustomed to working "on the double" . . . accustomed to handling the tough jobs in the tight spots where speed, stamina, and economy are essential.

That's why Insley Excavators now are so in demand on every fighting front . . . and that's why, too, you will want an Insley Excavator after the war to handle your dirt moving assignments.

EXCAVATORS • CRANES • BUCKETS • CARTS
INSLEY
CONCRETE PLACING EQUIPMENT

INSLEY MANUFACTURING CORPORATION
INDIANAPOLIS 1, INDIANA

QUICK CLEAN-OUT, INSPECTION OR REPAIR
... WITHOUT BREAKING PIPE CONNECTIONS!



ECONOMY HORIZONTALLY SPLIT CASE PUMP PROVIDES EASY REMOVAL OF VITAL PARTS

Economy Double Suction Pumps sustain high rated efficiency over a long period of years by virtue of the unusual engineered features.

- Rotor supported between two liberal outboard bearings—giving longer life than is possible with overhung construction.
- High efficiency compared with other types, because inlet dia. can be kept small while leakage and friction losses are considerably reduced.
- All parts subject to wear are readily removed, without disturbing alignment of unit or pipe connections.
- End thrust is almost negligible—thus bearing construction is very much simplified.

These, and many other Economy advantages, are fully described in free descriptive literature. Write for your copy of Bulletin 408 today.

ECONOMY PUMPS, INC.
HAMILTON, OHIO, U. S. A.

HAFTRAKS • TRAKTRAILERS

LINN

CONTOUR-FOLLOWING TRACTION

are carrying loads in all climes where off-the-highway operation is required.

- Ruggedly constructed and amply powered for the toughest going.
- **From 5 to 20 tons capacity.**

THE LINN MANUFACTURING CORPORATION
MORRIS, NEW YORK

POSTWAR PROJECTS (Cont'd.)

Fla., Leesburg—City, expan., impry. age sys. Smith & Gallespie, Packard Jacksonville, engrs.

★**Ind., Connersville**—R. W. Castle and chn. Bd. P. Wks., City Hall treatment plant and sewerage sys. $1,250,000. J. W. Moore & Son, 720 Pythian Bldg., Indianapolis, engrs.

Mo., Kansas City—Dpt. P. Wks., Ch sewer construction program, inc Brooklyn to Prospect Sts., $27,900; to Lawn Sts.—43 St. to Towers Rd. Winner Rd. and Tullis St.—Hy. 24 River, $57,800; 34 to 36 Sts., Colu White Sts., $39,000; 50th Swope Park Myrtle St. at Brush Creek, $24,800; Relief Sewer-Wyandotte to Bway. S from Main to Walnut Sts. (balance), 67 to 71 Sts.—Prospect to Paseo Sts., 24 St.—Oakley to Blue River sewer, 51 St.—Wyoming St. to Brush Creek, 37 and Gillham Sts. to Linwood and Sts., $150,000.

N. J., Elizabeth—City, City Hall, sewer in northwest section of city. Storm sewer in Union Ave., $100,000. lins, City Hall, engr.

N. J., Montclair—Town, Town Hall, sewer collection sys. throughout $200,000. F. M. Galloway, Town Hall

N. Y., Babylon—Town, drains and age structures, $25,000 and inci $100,000. State Aid Planning Funds a

N. Y., Freeport—Town, storm wa gravity drain for power house, $25,0 cinerator imprvs., $40,000. State Aid ning Funds allotted.

N. Y., Irvington — Village, villa storm drains, $60,000. State Aid P Funds allotted.

N. Y., Peekskill—City, interceptin ers, outfall service and siphon line, disposal plant, $475,000. State Aid P Funds allotted.

N. Y., Rensselaer—City, storm sewers, $100,000; imprv. sanitary se sys., $100,000.

★**N. Y., Rye**—Town, new sanitary storm drains, pavement, sidewalk in 10 streets in Greenhaven area, new sanitary sewers, storm drains, ments, walks, curbs in 3 streets, in 10 Streets in Glen Oaks area, 3 streets, $28,080; new storm drai pavements in 11 streets, $84,840; re storm drains and providing new pa in 5 streets, $75,338; new sanitary storm drains, pavements and sidewa 9 streets in Milton Rd. section, new sewers, storm drains and pa in 3 streets, $49,000; new sanitary storm drains and pavements in 5 str Hix Park and Harbor Terrace area, new sanitary sewer in Rockridge $33,150. State Aid Planning Funds a

N. Y., Scarsdale — Village, new drains for 4 roads, $43,000. State Aid ning Funds allotted.

N. Y., Spring Valley—Village, garb cinerator. $50,000.

Pa., Oil City—Dpt. Streets & Publ prvts., 2 sewage pump. stations, sewage treatment works $228,000. Knowles, Inc., Park Bldg., Pittsburg consult. engrs. B. B. Weber, city en

Pa., Oil City—Dpt. Streets & Publ prvts., plans underway intercepting $200,000. B. B. Weber, city engr.

Tex., Brownwood—Town, storm $60,000; municipal incinerator, $65,00

Tex., Corpus Christi—Town, storm $400,000. A. McCormick, city engr.

Tex., Decatur—Town, disposal plan sewer extens. $30,000.

Tex., Dumas—Town, sewage disposal $25,000.

★**Tex., El Paso**—Town, storm dr sys. $400,000, incinerator $180,000.

Tex., Kerrville—Town, sanitary exten. $25,000.

Tex., Lockhart—Town, N. Clark Town Hall, sanitary sewerage sys. imprvs. $100,000. J. Montgomery, hart, engr.

Tex., Lott—Town, sanitary sewer water sys. extens. $25,000.

Tex., Lubbock — Town, sanitary $50,000.

Tex., Mart—Town, sanitary sewe ten., $30,000. Koch & Fowler, Gre tional Life Bldg., Dallas, engrs.

Tex., Paris—Sewer treatment $50,000. W. Hicks, City Hall, engr.

Tex., Paris—Sanitary sewers, $25,0 Hicks, City Hall, engr.

Tex., Raymondville—Town, storm $25,000.

Tex., Sourlake—Sanitary sewerage $35,000. W. W. McVea, Sourlake, engr.

Tex., West Columbia—Sewage d plant. $25,000. J. L. Williams, W lumbia, engr.

...STWAR PROJECTS (Cont'd.)

...t., **Owen Sound**—City, W. G. Case, ...or, City Hall, sewage disposal plant. ...,000. Dorr Co., Inc., 80 Richmond St. ... Toronto, engrs. CD 3/23—ENR 4/6.

...t., **Whitby**—Municipality, sewer extens. ...,000. H. L. Pringle, Town Hall, engr. ...1/5—ENR 5/27.

BRIDGES

...e., **Bath**—State Hy. Dpt., State House ...gusta, bridge, concrete retaining walls ... gravel approaches. $295,000.

...Mich., **Detroit**—Dpt. P. Wks., City Hall, ...making plans grade separation struc...s at Railroad and street intersections ... New York Central R.R. and E. Grand ...d.; Michigan Central R.R. and Lonyo Rd.; ...ntral Ave.; Caniff-Lynch Rd. and Grand ...nk Western R.R.; Dearborn Ave. and ...e Marquette-Wabash R.R. $6,825,000. G. ... Thompson, city engr. CD 3/30/43—ENR ...43.

...Mo., **Kansas City**—Dpt. P. Wks., City ... Hall, 15 St. Viaduct across Centropolis ...cks and the Blue River, the Manchester ...proach to come in some following year, ...25,000. Howard, Needles, Tammen & ...rgendoff, 1012 Baltimore St., engrs., CD ...—ENR 7/22; bridges at Elmwood and ...sh Creek, $59,400; Belleview and Brush ...ek, $50,000.

...Y., **Hudson Falls**—Comrs. Washington ... new bridges, Battenkill River, $30,000; ...own of Easton, over Hudson River, $100,...; in town of Granville over Metowee ...er, $35,000. State Aid Planning Funds ...tted.

...Tex., **El Paso**—Town, grade separation, ...$2,000,000.

...lta., **Calgary**—Municipality, in associa... with Canadian Pacific Ry. Co., J. E. ...strong, ch. engr., Windsor Station, Mon..., Que., subway under tracks on 4 St. ...t. $100,000.

...lta., **Calgary** — Municipality, 2 new ...dges. $425,000.

...nt., **Niagara Falls**—Province of Ontario, ...onto, grade separation. $120,000. Dpt. P. ..., Toronto, engrs.

STREETS AND ROADS

...a., **Mariana**—City, general street imprvs., ... other facilities, incl. sewage, water... Smith & Gallespie, Packard Bldg., ...noxville, engrs.

...ich., **Grosse Pointe Farms** — Village, ...et paving, $135,000. M. M. Smith, Grosse ...nte Farms, engr.

...Mo., **Kansas City**—Dpt. P. Wks., City Hall, Southwest Trafficway from 14 to ...St. and Penn Ave., incl. 16 St. Overpass ... main viaduct from 20 to 26 Sts., $500,000; ...thwest Trafficway from 38 St. and Sum... Ave. to Belleview and Roanoke Parkway, ...,000; Manchester Trafficway from 19 St. ...Hy. 40, incl. grading, drainage and pav... $158,000; 23 St., Van Brunt Blvd. to ...eland St., $136,500; street widening and ...nstruction Bway., Pershing to 25 Sts. ... 26 St.-Bway. to Pennsylvania St., ...,600; Westport Rd., Belleview to Main ..., $26,700; 55 St.-Swope Parkway to Ward ...kway, $255,750; Prospect St.-Independence ... to Hy. 71, $500,000; St. John Ave.—Ben... to Belmont Sts., $351,500; Elmwood St., ...50 to 45 St., $39,600; Raytown Rd., 31 to ...Sts., $48,600; sidewalk and curb repairs ... replacement, $500,000; residential street ...surfacing, $1,500,900; Central Industrial ...trict street imprvs., incl. reconstructing ...rsection 9 St.-State line to Mulberry St., ...,000, Mulberry St.-6 to 13 Sts., $45,500, ...-Hickory to Madison Sts., $41,000, Hick... St., 8 to 13 Sts., $29,200, St. Louis Ave.-...erty to Union Sts., $54,000.

...J., **Montclair**—Town, Town Hall, con...te curbs and replacement of same ...oughout town. $115,000. F. M. Gallo..., Town Hall, engr.

...Y., **Babylon**—Town, sidewalks, curbs, ...ters. $25,000. State Aid Planning Funds ...tted. CD 4/7—ENR 4/20.

...Y., **Ballston Spa**—Comrs. Saratoga Co., ...minous macadam surfacing Rd. 17, ...,500; Rd. 104, $33,000; Rd. 22, $25,000; ... 64, $23,000; bituminous macadam resur...ing Rd. 91, $96,000; Rd. 63, $63,000; Rd. ...72,000. State Aid Planning Funds ...tted.

...N. Y., **Canton**—Comrs. St. Lawrence Co., ...constructing roads, $923,000; reconstruct... existing roads, $88,000. State Aid Plan... Funds allotted.

...Y., **Clarkstown**—Town, New Valley Rd., ...en. Church St. $27,000.

...N. Y., **Hudson Falls**—Comrs. Washington ...Co., constructing new roads, Gull Bay, ...,000; reconstructing, imprvs. 7 roads, ...,900; Middle Falls State Rd. to Crandall's ...ners, $184,140; road—Barkers Grove to ...th Cambridge, $61,920; new road, West ... Ann to Vaughn Rd., $38,880; Lake ...derdale to Duggan's Corners, $30,960; S. ...yle to Greenwich-Salem State Rd., ...,440; reconstructing road, Salem through ... Hebron to W. Pawlet, $311,220. State ... Planning Funds allotted.

Why make your engine use steps?

Internal combustion engines, because they cannot start in high, are usually provided with a series of steps or gears so that the driven load can be applied gradually as the engine gains speed.

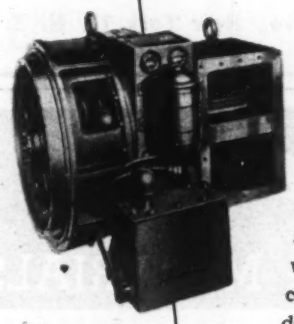
At each step, the engine must be slowed down slightly to permit shifting of gears. Thus, progression from idling to top speed looks like this:

Hydraulic drives give your engine the equal of an "escalator" . . . no slow down from step to step. The result is a smooth, steady acceleration with no jerks . . . no shock loads . . . either on the engine or the driven unit.

Both the Twin Disc Hydraulic Coupling and the *Hydraulic Torque Converter provide this cushion for smooth, shockless acceleration. But only the Twin Disc Hydraulic Torque Converter gives you the added advantage of torque multiplication, amounting to five times the input torque when the output shaft is stalled.

We have accumulated a fund of field data on the use of both types of hydraulic drives. Our engineers would be glad to place this at your disposal while you're planning new products or modernizing the old ones. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin, (Hydraulic Division, Rockford, Illinois).

*Lysholm-Smith type.



Hydraulic Torque Converter

Hydraulic Power Take-off

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PRE-STRESSED
Concrete Construction

OF SURFACE TANKS, ELEVATED TANKS, STAND-PIPES, UNDERGROUND TANKS, RESERVOIRS, CONDUITS, PENSTOCKS, ETC.

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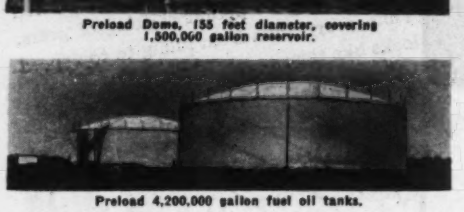
Preload Dome, 155 feet diameter, covering 1,500,000 gallon reservoir.



Preload 4,200,000 gallon fuel oil tanks.

Preload 200,000 gallon elevated water tank 88 feet diameter, 126 feet high.

Preload experience gained in hundreds of projects has made it possible to design with proper consideration of earth loads, foundations, shrinkage, temperature differences, plastic flow, working stresses, and all other factors which go into this type construction, to your most exacting requirements.

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POSTWAR PROJECTS (Cont'd.)

N. Y., Irvington—Village highway placement and imprvs. $100,000. State Planning Funds allotted.

★**N. Y., Kingston**—Comrs. Ulster Co., roads. $654,000. State Aid Planning Fu allotted.

★**N. Y., Mamaroneck**—Town, rebuild roads, $489,142; resurfacing ro $111,509. State Aid Planning Funds allot

N. Y., New City—Rockland Co. Com New City, County Rd. 47. $175,000.

N. Y., Rye—Town, macadam pavem and gutters in 7 streets. $61,228. State Planning Funds allotted.

N. Y., Saratoga Springs—City, new pa ment on N. Bway. $57,319. State Aid Pl ning Funds allotted.

N. Y., Scarsdale—Village, widening, imp 4 streets, $33,000; 3 roads, $61,500. St Aid Planning Funds allotted.

N. Y., Schoharie—Comrs. Schoharie Co. mi. county-wide hy. imprvs. $325,000. St Aid Planning Funds allotted.

N. Y., Troy—Comrs. Rensselaer Co. T constructing, reconstructing 14 roads, $1 000; reconstructing County Road $35,000; reconstructing Bway., $37, imprv. Forbes Ave., $44,000.

★**Pa., Oil City** — Dpt. Streets & Pu Imprvts., plans underway imprv. streets, $250,000; preliminary studies tr circle and bridges for by-passing business tion, $500,000. B. B. Weber, city engr.

Tex, Brownwood — Town, street pav $135,000.

★**Tex., Corpus Christi**—Street pav $1,200,000. A. McCormick, city engr.

★**Tex., Corpus Christi**—Nueces Co., Judge, Corpus Christi, road grading, p ing, bridges, imprvs. $1,600,000. Jas Carnutte, co. engr.

Tex., Dayton—Town, bond election s street paving, grading, etc. $70,000.

Tex., Dumas—Town, street paving $4

Tex., El Paso—Town, street widen grading, paving. $140,000.

Tex., Smithville—Town, street pav $25,000.

Tex., Kilgore — Town, paving. $1 A. P. Noyes, c/o owner, engr.

Tex., Paris—Town, street grading, pav $40,000. W. Hicks, c/o owner, engr.

EARTHWORK, WATERWAYS

†Alabama and Florida—U. S. Eng., 1 Douglas Sts. N.W., Wash., 25, D. C., liminary examinations and surveys for f control, etc., Chipola River, Alabama Florida.

★**†Arkansas and Louisiana**—U. S. E 1 and Douglas Sts. N.W., Wash., D. C., flood control on Boeuf and Te Rivers and Bayou Macon, Lower Missi River. $5,013,000.

★**†Arkansas** — U. S. Eng., 1 and Dou Sts. N.W., Wash., 25, D. C., compl Little Missouri River, Red-Ouachita R Basin, $3,800,000.

★**†California**—Bureau Reclamation, tom House, Denver, 2, Colo., repa Colorado River, San Diego, $22,000,000; river, Palo Verde Mesa, $1,200,000; river, All-American, $1,000,000; Guy River, Santa Barbara, $13,500,000; Little Creek, Trigo, $3,000,000, Pajaro River, lister, $3,000,000, Russian River, Ru River, $13,450,000, foregoing projects rate from Central Valley Project; repa American River, Folsom Dam, $16,0 imprv. Bear River, Rollins, $2,000,000; & Putah Creeks, Yolo, $10,000,000, Cala River, Stockton, $7,600,000; Consu River, Nashville, $6,920,000; Feather R Oroville, $123,940,000; Kaweah River, minous, $5,000,000; Kern River, Kern, 455,000; same river, Arvin-Edison, $9,0 King River, $53,000,000; Sacramento R Table Mt., $55,000,000; same river, Canyon, $13,000,000; same river, So $10,100,000; Stanislaus River, New Me $22,256,000; Tule River, Success, $2,6 Tuolumne River, Jacksonville, $13,1 Yuba River, Lower Narrows, complete Initial Central Valley Project tures, $133,680,000; miscellaneous cons tion, $2,500,000. Total $635,527,000.

†California—U. S. Eng., 1 and Dou Sts., N.W., Wash., 25, D. C., prelim examinations and surveys for flood con etc., San Rafael Creek and its tributari

★**†California**—U. S. Eng., 1 and Dou Sts. N.W., Wash., 25, D. C., local protection on San Diego River, San Di River Basin, San Diego, $370,000; on tura River and tributaries, at Ventura Ojai, Ventura River Basin, $1,600,000; Ana River Basin and for protection Orange Co., incl. projects on Lytle Cajon Creeks at San Bernardino and ton, Santa Ana River Basin, $10,0 Los Angeles, and San Gabriel Rivers Ballona Creek, $25,000,000; flood con etc., on Sacramento River, Sacramento Joaquin River Basin, $46,056,000; for

TWAR PROJECTS (Cont'd.)

Reservoir on Kern River, in San
uin Valley, $6,800,000; Terminus and
ons Reservoirs on Kaweah and Tule
rs, San Joaquin Valley, $4,600,000;
nes River and Tulare Lake Basin, $19,-
00; various streams in Merced Co.
in Group, San Joaquin Valley, $1,300,-
flood control imprvs. on Lower San
uin River and tributaries, incl. Tuo-
ne and Stanislaus Rivers, $8,000,000, all
Joaquin River.

Colorado—U. S. Eng., 1 and Douglas
ts. N.W., Wash., 25, D. C., flood pro-
on on tributaries of Fountane Que
ile River at Colorado Springs, $500,000;
Purgatoire River at Trinidad, $909,000,
Arkansas River Basin; on Bear Creek
Morrison, Missouri River Basin, $220,-
on Willow Creek at Creede, Rio Grande
, $48,500; completion Cherry Creek
tributaries, Missouri River Basin, $7,-
00.

Connecticut—U. S. Eng., 1 and Doug-
as Sts. N.W., Wash., 25, D. C., imprv.
necticut River Basin, $30,000,000;
nes River Basin $7,200,000; Thomaston
rvoir on the Naugatuck River, for
control in the Housatonic River Basin,
1,000.

Florida—U. S. Eng., 1 and Douglas Sts.
, Wash., 25, D. C., preliminary exami-
ns and surveys for flood control, etc.,
assas River and its tributaries and of
cent areas in Gilchreat and Levy Coun-
Oklawaha River and its tributaries,
adjacent areas in Alachua and Marion
ties.

Georgia—U. S. Eng., 1 and Douglas
ts. N.W., Wash., 25, D. C., comple-
of Allatoona Reservoir on the Etowah
, Mobile and Alabama-Coosa River
s, $14,400,000.

Idaho—U. S. Eng., 1 and Douglas Sts.
.W., Wash., 25, D. C., flood protection
Snake River at Heise, Roberts and
er, Columbia River Basin, $743,000.

Illinois—U. S. Eng., 1 and Douglas Sts.
, Wash., 25, D. C., preliminary exami-
ns and surveys for flood control, etc.,
s River, Joe Daviess Co.

Ill., Galena—U. S. Eng., 1 and Douglas
N.W., Wash., 25, D. C., flood protection
Galena River, Upper Mississippi River
n, $190,000.

Indiana and Ohio—U. S. Eng., 1 and
las Sts. N.W., Wash., 25, D. C., pre-
ary examinations and surveys for flood
rol, etc., Maumee River.

Indiana—U. S. Eng., 1 and Douglas Sts.
, Wash., 25, D. C., preliminary exami-
ns and surveys for flood control, etc.,
n Creek.

Iowa—U. S. Eng., 1 and Douglas Sts.
, Wash., 25, D. C., flood protection on
ippi River, at Sabula, $25,000; on
Creek and Turkey River at Elkport,
00; both Upper Mississippi River Basin;
control on East Fork of Boyer River
nison, $17,830; on Nishnabotna River
amburg, $236,000, both Missouri River

Kansas and Missouri—U. S. Eng., 1
nd Douglas Sts. N. W., Wash., 25, D. C.,
protection for Kansas City, Kan.,
Mo., Missouri River Basin, $8,445,000.

Minnesota—U. S. Eng., 1 and Douglas
N.W., Wash., 25, D. C., preliminary
inations and surveys for flood control,
Buffalo River, Wild Rice River, Marsh
, San Hill River, Red Lake River,
au River, Snake River, Middle River,
arac River, Two Rivers, Warroad River
Bull Dog Creek, Mississippi River and
ributaries in Aitkin Co.

Minnesota—U. S. Eng., 1 and Douglas
ts. N.W., Wash., 25, D. C., flood con-
for Red Lake River incl. Clearwater
, Red River of the North Basin, $902,-

Minn., Minneapolis — City Bd. Park
omrs., C. E. Doell, secy., dredging Dia.
Lake and filling Pearl Lake at south
of city and parking entire area.
00. A. E. Berthe, engr. Bd. Park
rs.

Mississippi—U. S. Eng., 1 and Douglas
ts. N.W., Wash., 25, D. C., flood control
the Big Sunflower, Little Sunflower,
puckena and Quiver Rivers and their
taries and on Hill Brake-Mill Creek
, Bogue Phalia, Ditchlow Bayou, Deer
and Steele Bayou, $3,752,000; flood
ction on backwater area of Yazoo
includes imprvs. for protection of
rtia area at an estimated addnl. cost
,061,000 or to incl. imprvs. for protec-
Satartia area plus its extension at esti-
d addnl. cost of $1,952,000, all Lower
ssippi River.

Missouri and Kansas—U. S. Eng., 1 and
las Sts. N.W., Wash., 25, D. C., pre-
ary examinations and surveys for flood
rol, etc., Osage River.

Missouri—U. S. Eng., 1 and Douglas Sts.
, Wash., 25, D. C., flood protection on
ssippi River at Sainte Genevieve Levee
, Upper Mississippi River Basin,
00.

Mo., Kansas City—Dpt. P. Wks., City Hall,
control—right-of-way acquisition from
line to A.S.B. Bridge, incl. all costs
nt railway relocation which may be
eeable to the City, incl. relocation sew-
pump. station and access roads, $460,000.

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EIGHT trucks carrying five Victory Huts each—and in a few hours all of Company "B" will be installed in weathertight, comfortable barracks. Here's your modern answer to military housing—fully pre-fabricated and portable Victory Huts, made by Texas Pre-Fabricated House and Tent Company.

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Victory Huts have already traveled to the far corners of the fighting globe—have *proved* themselves practical and efficient in extremes of temperature and season. They're comfortable, because they are Air-Space insulated, insect-resistant, bright. Efficient and mobile as a jeep, they can be erected quickly (six man-hours per unit) demounted easily. And since 2, 3 or more Victory Huts can be assembled together as a multi-unit, they serve as administrative offices, hospitals or other large installation.

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Home Address _____
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Further Remarks _____

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Houston 2, Texas

POSTWAR PROJECTS (Cont'd.)

†**Montana**—U. S. Eng., 1 and Douglas N.W., Wash., 25, D. C., flood protection Harlem, $21,100; on Milk River at Ha $313,100, both Missouri River Basin.

★†**New York and Pennsylvania**—U. S. E 1, and Douglas Sts. N.W., Wash., D. C., flood control in southern New Y and eastern Pennsylvania, incl. Sc Plymouth and Genegantslet Reservoirs tributaries of the Chenango River, in Sus hanna River Basin, $4,755,000.

†**New York**—U. S. Eng., 1 and Dou Sts. N.W., Wash., 25, D. C., preliminary aminations and surveys for flood control, Scajaquada Creek and its tributaries.

★†**New York**—U. S. Eng., 1 and Dou Sts. N.W., Wash., 25, D. C., Pan Mountain Reservoir on Moose River, $60 CD 12/29—ENR 1/13; flood control on C tenango Creek and tributaries, $111,000; Owasco Inlet and Outlet, Montville and Creeks, State Ditch and Crane Brook, $64 all Great Lakes Basin.

★**N. Y., Black River**—Black River Re lating Dist., Higley Mountain Reserv $1,797,000. State Aid Planning Funds lotted.

N. Y., North Tarrytown—Town, waterf development, $40,000. State Aid Plan Funds allotted.

†**North Dakota**—U. S. Eng., 1 and Do las Sts. N.W., Wash., 25, D. C., flood con on Knife River at Beulah, $26,100, and Hazen, $6,600, both Missouri River Basin.

★†**Ohio**—U. S. Eng., 1 and Douglas N.W., Wash., 25, D. C., flood protec works in Lake Chautauqua and Chadak River area, $135,000; on Short Creek at lonvale and Adena, $158,200; Burr Oak Re voir on Hocking River, $400,000, all O River Basin.

★†**Oregon**—U. S. Eng., 1 and Douglas N.W., Wash., 25, D. C., flood protect on Coquille River, Coquille River Ba $143,000; on Nehalem River, Nehalem Ri Basin, $23,000; Willamette River Ba $20,000,000; on Alkali Canyon at Arling Columbia River Basin, $118,000.

★†**Pennsylvania**—U. S. Eng., 1 and Do las Sts. N.W., Wash., 25, D. C., l protection works on Susquehanna River Harrisburg, $2,227,000; flood protection Little Juniata River, at Tyrone, $1,392, flood control for Raystown Reservoir on Raystown Branch of Juniata River, 000,000, all foregoing Susquehanna Ri Basin; local flood protection work on Loy hanna Creek at Latrobe, $112,500; imp Youghiogheny River Basin, $37,970, Rowlesburg Reservoir on Cheat Riv $29,230,000, all foregoing Ohio River Ba

★†**Texas**—U. S. Eng., 1 and Douglas N.W., Wash., 25, D. C., completion No Concho River, $4,800,000; Pecan Bay $1,560,000, both Colorado River Basin; Wi ney Reservoir, $15,000,000, Brazos Ri Basin.

★**Tex., Corpus Christi**—Nueces Co., Judge, Corpus Christi, drainage, lev etc. $1,350,000. Jas. V. Carnutte, co. en

Tex., Dayton—Town, T. Collins, may City Hall, bond election soon, drainag $60,000.

★†**Washington**—U. S. Eng., 1 and Doug Sts., N.W., Wash., D. C., flood protect on Palouse River and tributaries at Pullm and Colfax, Columbia River Basin, $478,0 on Willapa River at Raymond, Willapa Ri Basin, $127,000.

†**Puerto Rico**—U. S. Eng., 1 and Doug Sts. N.W., Wash., 25, D. C., preliminar examinations and surveys for flood contr etc., Bayamon and Hondo Rivers and t tributaries, Municipality of Bayamon.

UNCLASSIFIED

Conn., Avon—TELEVISION BROADCAS ING STATION—The Travelers Broadcast Station WTIC, 26 Grove St., Hartford, tel vision broadcasting station, incl. tower, el tric installation, Avon Mountain. Ow $25,000.

Conn., Fairfield—SWIMMING FACILITI etc.—Town Bd. Park Comrs., Town Hall preparing swimming facilities at ponds, co structing field house, tennis court, pla grounds, drinking fountains, etc., Strati and Gould Manor Parks. $30,000.

Ind., Decatur—AIRPORT—City Aviati Comn., Decatur, airport, incl. runwa hangar, grading, drainage, $50,000.

Me., East Boothbay—SHIPYARD PLANT Goudy & Stevens Shipbuilding Co., Ea Boothbay, brick, steel undercover shipbuil ing plant. Over $40,000.

★**Mass., Boston**—DOCKS—Commonwe of Massachusetts, Dpt. P. Wks., Nashua St., new waterfront docks. $4,000,

Mich., Grosse Pointe Farms—PARKS, —Village, parks and recreation. $196,0 M. M. Smith, Grosse Pointe Farms, engr.

★**Mo., Kansas City**—AIRPORT IMPROVE MENTS—Dpt. P. Wks., City Hall, Kans City Grandview Airport imprvs., incl. a ministration and accessory bldgs., sewa disposal sys., watermain exten., service ro and parking areas, $1,050,000; municipal ai port imprvs., incl. pump. station for sewa

...TWAR PROJECTS (Cont'd.)

...storm water, field drainage, strengthen ...e and roadway, $133,161.

...Kansas City — TRACK REMOVAL — ...t. P. Wks., City Hall, street car track re... ...val, $360,000.

...N. H., Haverhill—AIRPORT—Town, Town ...k, airport, incl. runways, hangars, etc., ...as Land. $150,000.

...N. Y., Oyster Bay—BEACH IMPROVE...ENTS—Town, beach imprvs., on Tobay, ...osevelt Park, Glenwood Landing, Beek... ...as and Centre Island Beaches, $50,000. ...ds Aid Planning Funds allotted.

...Tex., Brownwood—PLAYGROUNDS, etc. ...Town playgrounds, athletic courts, swim... ...ng pool, recreation facilities, drainage, ...ound imprvs., etc. $250,000. A. McCor... ...ck, c/o City Hall, engr.

...Tex., Corpus Christi—AIRPORT—City ...and Nueces Co., city-county airport. ...,000,000.

...Tex., El Paso—AIRPORT—Town, airport ...rvs., hangars, etc. $110,000.

...Tex., Floydada—AIRPORT—Floyd Co., c/o ...ydada, Judge, airport. $175,000.

...Tex., Giddings—SWIMMING POOL—Town, ...imming pool. $52,000.

...Tex., Houston—AIRPORT DRAINAGE— ...y, airport drainage. $300,000.

...Tex., Kerrville—GAS SYSTEMS—Town, ...tural gas sys. $25,000.

...Tex., Taylor—AIRPORT—City of Taylor ...d Williamson Co., c/o Airport Planning ...n, Taylor, Class 2 airport, incl. 2 run... ...ys, etc., on 320 acre tract. Over $150,000.

...Alta., Camrose—AIRPORT—Municipality, ...port. $100,000.

...Ont., Acton—AIRPORT—Municipality, air... ...rt. $50,000.

...Ont., Bloubeim—AIRPORT—Muncipality, ...rport on 50 acre site. $75,000.

...Ont., Temiskaming—SEAPLANE BASE— ...unicipality, seaplane base, $70,000.

...Que., Riviere du Loup—AIRPORT—Munic... ...ality, airport. $100,000.

LATIN AMERICA

...Paraguay, Asuncion—Government of Para... ...ay, Asuncion, water and sewerage sys. ...rson, Brinckerhoff, Hogan & Macdonald, ...1 Maiden Lane, New York, N. Y., engrs.

PUBLIC BUILDINGS

...Calif., South Gate—City, City Hall, mu... ...nicipal auditorium, hall of justice, swim... ...ng pool, etc. $500,000. Allen & Lutzi, ...11 Wilshire Blvd., Los Angeles, archts.

...Conn., North Haven—Town, Bd. Educ., ...wn Hall, plans by R. H. S. Booth, Old ...chard Rd., brick, steel, limestone school, ...sembly hall, cafeteria, Ridge Rd. $150,000. ... D. Harrigan, 37 Whitney Ave., New ...aven, engr. A. M. Thomas, 29 Whitney ...ve., consult. engr.

...Ill., Champaign—University of Illinois, ...R. A. Stipes, Jr., chn. Alumni Assoc., ...ampaign, sports bldgs. $1,500,000.

...Ill., Madison—Madison School Dist. Bd. ...Educ. c/o G. Wilkins, supt., plans by Wm. ...ltner, Inc., 408 Bd. Educ. Bldg., 911 ...ocust St., St. Louis, 1, Mo., rein.-con., brick, ...mas combination high and grade school ...dg. $900,000. CD 4/10—ENR 4/20.

...Mass., Danvers—Commonwealth of Mas... ...sachusetts, Dpt. Mental Health, 100 ...anhua St., Boston, plans by Appleton & ...arms, 53 State St., Boston, infirmary, ...M 18, Danvers State Hospital. $550,000.

...Mich., Grosse Pointe Farms — Village, ...dgs. $237,000. M. M. Smith, Grosse Pointe ...arms, engr.

...Mo., Kansas City—Dpt. P. Wks., City Hall, ...blic works garage. $250,000.

...N. J., Montclair—Town, Town Hall, fire ...adquarters bldg. $150,000. F. M. Galloway, ...wn Hall, engr.

...O., Royalton—Royalton Bd. Educ., P. Av... ...ill, clk., 881 Royalton Rd., Brecksville, ...ans by H. A. Fulton, 6014 Euclid Ave., ...eveland, high school bld. $300,000.

...N. S., Halifax—Bd. School Comrs., City ...all, 5 new schools. $250,000.

...Ont., Kitchener and Waterloo—Munici... ...palities of Kitchener and Waterloo, c/o ...ty Clerk, Kitchener, new houses and re... ...iring existing homes. $10,500,000.

...Ont., Peterborough—Municipality, c/o E. A. ...tram, clk., plans by W. R. Blackwell, ...mmerce Bank Bldg., City Hall. $250,000. ...D 2/19—ENR 3/9.

...Ont., Toronto—Province of Ontario, To... ...onto, new county bldg. and courthouse in ...rince Edward Co. $250,000. Dpt. P. Wks., ...oronto, engrs.

...Sask., Regina—Province of Saskatchewan, ...egina, medical college. $300,000. Dpt. P. ...ks., Regina, engrs.

...Sask., Regina—Province of Saskatchewan, ...egina, mental hospital. $350,000. Dpt. P. ...ks., Regina, engr.

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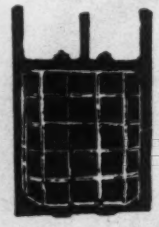

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TWAR PROJECTS (Cont'd.)

COMMERCIAL BUILDINGS

W., **Los Angeles**—Owner, c/o Rob't. V. ch, archt., 9470 Santa Monica Blvd., erly Hills, 42 unit, frame, stucco, brick r motor hotel. $200,000.

Manchester — Sheridan Corp., 613 St., plans by Kane & Fairchild, 49 St., Hartford, 4 story, brick, steel incl. stores. $150,000. CD 2/21—ENR

St. Louis—Missouri Athletic Club, Dr. Marquard, pres., 409 Washington Ave., ools, Zone 2, club bldg. imprvs., addns. enlarged solarium, etc. $219,000.

Y., **Batavia**—Disabled American Vet- c/o American Legion, C. W. Bohm, chs. in charge, 2 story, bsmnt., brick, ete, steel clubhouse. $150,000.

Erie—First Presbyterian Church, Dr. Jackson, pastor, 5 and Peach Sts., ding church. $175,000-$200,000.

I., **Providence** — Miriam Hospital, 31 arade St., plans by Barker & Turoff, Grosvenor Bldg., 5 story, brick, steel ital, Summit Ave. and 6 St. $550,000.

x., **Dallas**—Southern Methodist Univer- ty, Dallas, constructing chemistry bldg., a Student Union Bldg. (2). $750,000. 9/1—ENR 9/9.

ash., **Seattle** — First Presbyterian Church, 7 and Spring Sts., Zone 1, plans W. J. Bain, Smith Tower, Zone 4, orial chapel. $500,000.

C., **Vancouver**—F. W. Woolworth Co., 347 Bay St., Toronto, Ont., 3 story 139 W. Hastings St. $300,000.

t., **Toronto**—The Women's College Hos- 76 Grenville St., plans by H. J. h, 42 Charles St., nurses residence, venor St., east of Bay St. $250,000.

INDUSTRIAL BUILDINGS

., **Baltimore**—LAUNDRY—State Wiping Laundry, North Vincent St., 1 story, steel laundry bldg. Mt. Winans Sect.

n., **Southbridge** — WAREHOUSE — bridge Finishing Co., Sandersdale, bridge, 3 story, 80x325 ft., brick ware- $300,000. Lockwood Greene Engrs., 40 Rockefeller Plaza, New York, N. Y.,

., **St. Louis**—WAREHOUSE, etc.—In- ational Harvester Co., 180 N. Michigan Chicago, Ill., warehouse and distr. on site containing 105,000 sq.ft. on Dock and Ninth Sts. $150,000 or

x., **San Antonio**—FACTORY—Jos. Love. 111 N. Pecos St., expan. garment mfg. ry. Over $40,000.

Wash., **Longview**—FACTORY—Owens- Illinois Glass Corp., 135 Stockton St., San ncisco, Calif., plans by The Austin Co., Bldg., Oakland, Calif., 14 factory s, incl. two 3 story bldgs., 2 or 3 two bldgs., and balance of bldgs., incl. warehouses all 1 story structures. 0,000.

s., **Stoughton** — FACTORY — Boreva tswear, Inc., Stoughton, plans by P. Horner, 14 S. Carroll St., Madison, 1 100x150 ft. factory bldg.

rthwest Territory, **Yellowknife**—MILL— Yellow Knife Gold Mines, Ltd., 80 W. St., Toronto, Ont., 1,000 ton daily ity mill.

t., **Pamour**—MILL—Hoyla Gold Mines. 215 W. King St., Toronto, 700 ton constr. $75,000.

., **Montreal**—PLANT—White Co., Ltd., DeGaspe St., plant. $40,000.

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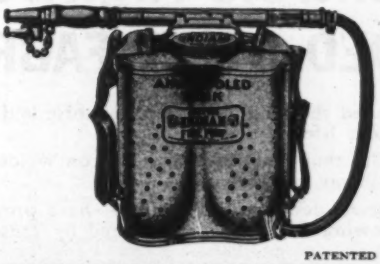

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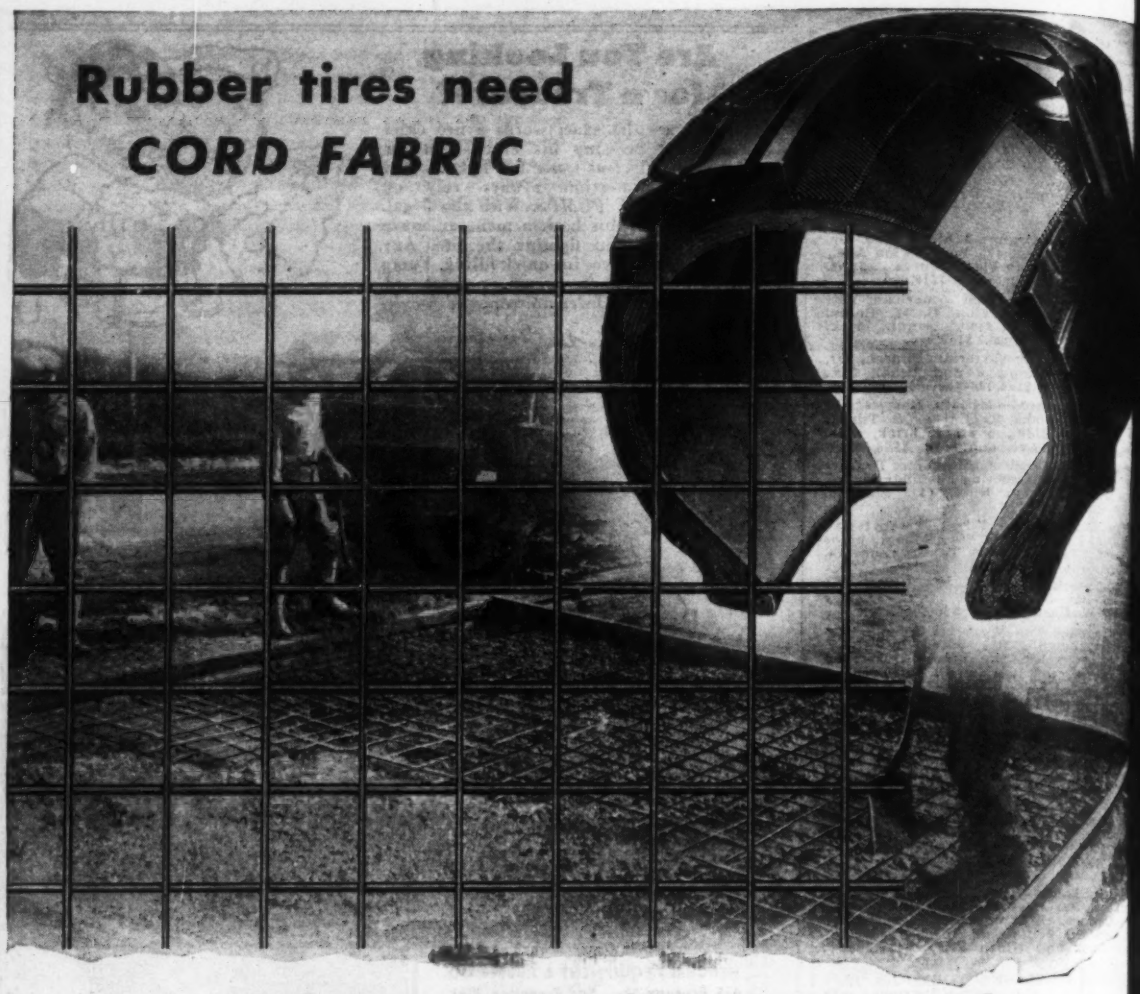

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WATER SUPPLY

...D AT WORK

...Carrabelle—City, water and sewer ...ilities. $175,000. **FWA.** Smith & ... Realty Bldg., Jacksonville, engrs. ...ENR 4/13.

Miami Beach—WW imprvs. $500,-...

...lumbus—Bd. Comrs. Muscogee Co., ... $66,000. Wiedeman & Singleton, ... Bldg., Atlanta engrs.

...Thomasville — City, exten., imprv. ... and sewerage sys., consisting ap- ... mi. 3- to 8-in watermains, valves, ...ranta, appurtenances and approx. ... to 15-in. sewer lines, approx. 2 ... to 24-in outfall lines, complete ... disposal plant, sewage pump, sta- ...essary appurtenances, Ga. 9-281-N. **FWA.**

...Natchitoches—City, drilling 2 wells, ...ing pipeline from water field south ... city. $144,000.

...st Union—Village, M. Scott Kin- ...ings. City Hall, bond election May ... reservoir, to construct dam. ... E. C. Zimmerman, Town Hall, ...CD 2/14—ENR 2/24.

...McAlester — City, water supply, ... incl. dams, levees, 200,000 gal. ...,000 cu. yd. earth, 20,000 lin. ft. ... etc $256,450. **FWA.** Collins Eng. ...Alester. engrs. CD 4/11—ENR 4/13.

...Houston—City, 39 watermain exten- ...sts, using 4- to 12-in. c.i. pipe for ...00 cons. $700,000.

...Halifax—City Clerk, installing fire ...long harbour front. $100,000.

Chippawa—Municipality, A. C. Hug- ...k, filtration plant, other imprvs. ... 150,000. Gore & Storrie, 1130 Bay ...ronto, engrs. CD 2/3—ENR 2/10.

...Galt—North Dumfries Twp., Galt, ...ains $30,000. Pub. Utilities Comn., ...en St., engrs.

Long Branch (Postal Dist., Tor- ...Municipality, G. H. Clarkson, 1513 ...Shore Rd., watermain construction.

...ASKED

Bids Asked May 8

...Phila.—Dpt. P. Wks., Bureau of ... City Hall Annex, Contr. 218-WWI, ...ains in Academy Rd., and Contr. ...71, structures and piping for 40 ...pump unit in south engine house, ...n Point Pump. Station Plans deposit ...H. Neeson, dir.

Bids Asked May 11

...ns—City, A. Metheany, mayor, City ...Contr. 2, flocculation and settling ...new chemical bldg., filter plant ex- ...and repairing existing structures, ... Jones & Henry, Toledo Trust Bldg., ...engrs.

Bids Asked May 25

...Rockdale — Comrs. Baltimore Co., ...ns, Towson, Contr. 82-W, excav., ...g approx. 6,922 lin. ft. 6 and 8 ...water pipe, necessary appurtenances. ...eposit $5.

...IDDERS

...Marshall—U. Ruff, mayor, City Hall, ...ne and sys., from Grady Garms, 29 ...n Sts., Little Rock, **$23,500.** Est. ... M. L. Crist, c/o City Hall, engr.

...Reno—U. S. Eng., 1209 3 St., ...nto, I. Calif., Apr. 25, water line ...y to Reno Air Base, Spec. 875, from ... Van Valkenburgh, 201 N. 12 St., ...nto, Calif., **$52,116.**

...Dallas—E. Goforth, city secy., City ...pr. 19, Contr. 6, 4- to 24-in. c.i. ...ins, pump, house addns., to Sun- ...p. Plant, Tex. 41-651, from F. Del- ...1 Versailles St., **$333,783.** Est. $500,- ...rrection—low bidders name.) CD ...R 4/27, under LB.

...Houston—City, Apr. 19, 8- to 12-in. ...rmains, Bellaire Blvd., Kirby and ...side Drs., etc., from Massengale & ...20 Clifton St., **$27,856.**

...ACTS AWARDED

Brookley Field—U. S. Eng., Grant ... of Westwood St., Mobile, water ... warehouse sprinkler sys., Ser. No. ...Edgell Constr. Co., 7 Benedict Pl., ...$25,748. CD 4/14.

Location of ENR Correspondents

Symbols and Abbreviations Include:

† Federal Government
★ Project of $500,000 or over
ENR Engineering News-Record
CD Engineering News-Record Construction Daily
A-E-M Architect-Engineer-Management type of contract

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply	Unclassified
Sewers, Waste Disposal	Latin America
Bridges	Public Buildings
Streets & Roads	Commercial Buildings
Earthwork, Waterways	Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):
BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR):
LOW BIDDERS: On jobs below $500,000 value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.
CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

Note: To comply with censorship requirements, addresses on some reports are being generalized. Data which would reveal the purpose of the improvements and the size are withheld. The name of contractor and general area are reported.

Calif., Oakland and Alameda—East Bay Municipal Utility Distr., 512 16 St., Oakland, installing approx. 13,500 lin. ft. 6- to 24-in c.i. pipe in various streets. Spec. LS-313, to McGuire & Hester, 706 66 Ave., Oakland, **$69,636.** CD 4/27, under LB.

†Md., Aberdeen—U. S. Eng., Standard Oil Bldg., Baltimore, water sys. exten., to Dover & Lynch, Delaware Trust Bldg., Wilmington, Del., **$31,243.** Est. $25,000. CD 4/24—ENR 4/27, under LB.

N. J., Chatham — Commonwealth Water Co., 11 Beechwood Rd., 1 mi. water distr. mains, to W. G. Fritz Co., Inc., 69 Main St., West Orange, **$20,000.**

Tex., Houston—Goodyear Tire & Rubber Co., LaPorte Rd., 4 m.g. earth reservoir, to O. Hansen, 1906 Wayside Dr., **$27,000.**

Vt., Brattleboro—American Optical Co., 14 Mechanic St., Southbridge, Mass., water filtering sys., to Ley Constr. Co., 1215 Main St., Boston, Mass. Est. **$18,000.** Metcalf & Eddy, 1300 Statler Bldg., Boston, Mass., engrs. CD 4/17—ENR 4/20.

Ont., Leaside—Town, H. H. Talbot, mayor, 5,000 ft. 7 in. watermains, 6,000 ft. sewers, to Ruscica Bros., 25 Industrial St., **$47,745.** Bids 4/21. CD 4/18—ENR 1/27.

SEWERS, WASTE DISPOSAL

PROPOSED WORK

†Calif., La Mesa—City, approx. 24,174 ft. 8-to 12-in. outfall sanitary sewer, necessary appurtenances, Calif. 4-148-N. $164,000. **FWA.**

Conn., Derby—City, C. F. Caldwell, mayor, City Hall, sewage disposal plant. $250,000. G. E. Thompson, City Hall, city engr., Westcott & Mapes, Inc., 139 Orange St., New Haven, consult. engr. CD 2/21—ENR 2/27.

Conn., Meriden—City Clerk, City Hall, making plans, sanitary sewers. $100,000. C. P. Prann, c/o owner, engr.

Ill., Springfield—City, 18 in. storm sewer for surface water to extend from 4 St. to Bryn Mawr Blvd. down Bryn Mawr Parkway draining into Bunn Park Lagoon, $100,000; 48 and 30 in. sewer from First St. to MacArthur Blvd. on Park Dr., $50,000, both at Woodside and Capitol Twps., near here. L. Lush, Springfield, city engr.

Ia., Onawa—H. Skevington, city clk., sewage disposal plant. $65,000. Buell & Winter Engineering Co., 508 Ins. Exch. Bldg., Sioux City, engrs.

†Mo., Carsonville—Carsonville Sewer Dist., c/o Bd. Trustees, Carsonville, St. Louis, Zone 21, sanitary sewerage sys. $120,400. **FWA.** H. Shifrin, Shell Bldg., 1221 Locust St., St. Louis, Zone 3, engr.

Alta., Calgary—Municipality, storm sewerage sys. $100,000.

B. C., Kamloops—Municipality, H. M. Levey, clk., sewage treatment plant. $50,000. Gore & Storrie, 1130 Bay St., Toronto, Ont., engrs.

Ont., Long Branch (Postal Dist., Toronto)—Municipality, c/o G. H. Clarkson, 1513 Lake Shore Rd., sewer construction. $25,000.

Ont., Strathroy—C. Dermiss, town clk., Town Hall, sewerage sys., disposal plant. $100,000. James, Proctor & Redfern, Ltd., Excelsior Life Bldg., Toronto, engrs.

Que., Bedford—Municipality, sewer, watermains. $35,000.

Que., Cap de la Madeleine—R. Morrisetta, mayor, sewers, Fusey, St. Laurent, Notre Dame and Richeleau Sts. $64,000. J. E. Fleury, city engr.

Que., Longueuil—City, P. Pratt, mayor, making plans brick incinerator, concrete fdn., radial brick chimney, Route Gentilly at city limits. $40,000. J. E. Vincent, city engr. Marc Cing-Mars, 60 St. James St. W., Montreal, archt. J. G. Lefrancois, 125 Chambly Rd., consult. engr. CD 2/3—ENR 2/10.

BIDS ASKED

Bids Asked May 8

Ont., Sault Ste. Marie—E. Smith, engr., City Hall, incinerator for Municipality. $50,000.

Bids Asked May 17

†Md., Hyattsville—At office Washington Suburban Sanitary Conn., Hamilton St., 4,095 ft. 12- to 21-in. vitr. sewers, Contr. 172-S. Plans deposit $5. H. R. Hall, ch. engr.; adv. ENR 5/4.

Bids Asked May 22

Ont., St. Catherine—H. H. Smith, city clk., City Hall, incinerator plant. $65,000. B. F. Lamson, c/o owner, engr. CD 1/18—ENR 1/20.

Bids Asked May 23

†Va., Norfolk—At office Dpt. P. Wks., City Hall, 3 story, brick, rein.-con. incinerator bldg., equipped with 4 incinerator units, Va. 44-355. $266,100. **FWA.** Plans deposit $25. Extended date. Rudolph, Cooke & Van Leeuwen, Inc., 355 Monticello Arcade Bldg., archts. CD 4/25—ENR 4/27.

LOW BIDDERS

O., Cleveland—City, F. Foy, purch. agt., City Hall, sewer in W. 35 St. and Cecelia Ave., from Sylvester & DiPaolo Constr. Co., 1429 Lakeview Rd., **$25,531.** J. C. Wenrick, City Hall, city engr.

Tex., Houston—11,000 lin. ft. 6-to 8-in. sanitary sewers in Granlin Grove, etc., from Massengale & Sauer, 220 Clifton St., **$26,932.** CD 4/19—ENR 4/27.

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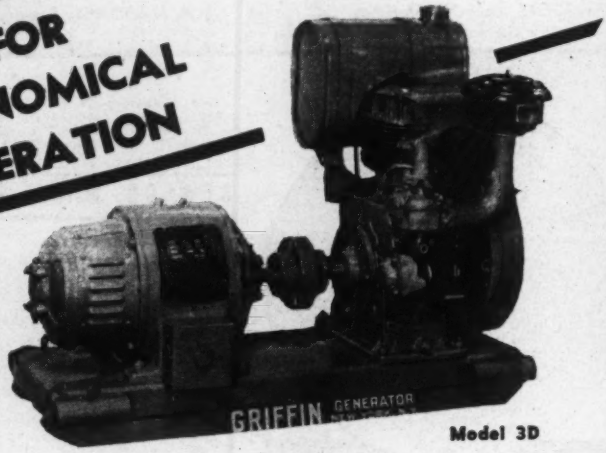

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CONTRACTS AWARDED

Mass., Milton—Bd. Town Selectmen, Hall, 8 and 10 in. concrete sanitary s various streets, to N. Ciboti & C. Asc 349 Huntington Ave., Hyde Park, CD 3/4/43—ENR 3/11/43.

†**N. Y., New Dorp (sta. Staten Isl** U. S. Eng., 120 Wall St., New York, Z drainage facilities, Contr. 30-076-Eng to M. L. Kostergard, 4 Coddington Ave., Dorp. Est. $42,954. Bids 4/8. CD

S. D., Huron—M. F. Walt, city aud. Hall, reconstructing sewage plant, to sen & Purtell, 1511 Randolph Ave., St. Minn., $27,933. Bids 4/24. CD 4/12-4/13.

Alta., Lethbridge—J. T. Watson, city sewage disposal plant, 2 settling tan sludge digestion tanks, etc., to Bird Co., Ltd., 707 Confederation Life Winnipeg, Man., over $25,000. Bids CD 3/16—ENR 3/23.

Ont., Hamilton—Sewers in Queenadale E. 13 and E. 15 Sts., to A. Cope & Sons, 19 Albert St., $28,374. CD 5/16.

Ont., Hamilton—Secy. Bd. Control, Barton St., to A. Cope & Sons, Ltd., bert St., $36,995. Est. $59,000. W. L Faul, City Hall, engr. CD 3/16.

BRIDGES

PROPOSED WORK

Ont., Ethel—Huron Co., Goderich con. bridge, day labor. $25,000. T. R terson, County Bldg., Goderich, engr 2/24—ENR 3/9.

Que., St. Cyrille—Municipality, A. clk., bridge over Bras d Ade River, P O. Desjardins, Dpt. P. Wks., Quebec engr.

BIDS ASKED

Bids Asked May 10

Ind., Galveston—Bd. Comrs. Cass C. C. Barnett, aud., Court House, Logan 2 span 70 ft. Rose Bridge, rein.-con. Deer Creek in Jackson Twp., near $30,000. Henry B. Steeg & Associates E. Market St., Indianapolis, archts.

Bids Asked May 17

California—State Div. Hys., G. T. M engr., Sacramento, repairing fenders, bridge across Napa River, west city of Vallejo, Solano Co.

LOW BIDDERS

N. J., Mt. Holly—Burlington Co., house, 80 ft. span rein.-con. bridge, wide over Rancocos Creek, on Pine St. Union Building & Constr. Corp., 611 Ave., Passaic, $64,440. F. L. Branin, A istration Bldg., engr.

CONTRACTS AWARDED

Georgia—State Hy Dpt., Atlanta, ing 4 bridges, Long and Wayne Co to Scott Constr. Co., Thomasville, Bids 4/21. CD 4/19.

N. J., Bridgeton—Cumberland Co., House, repairing Mauricetown Brid Delaware Bay Const. Co., Glover Ave valve, $34,620. Bids 4/10. CD 3/30—EN

Pa., North East—The New York, C & St. Louis R.R. Co., J. C. Wallace engr., Terminal Tower Bldg., Cleveland bridge reconstruction, incl. 2 new st abutments, excav. and coffer dam wo Freeman & Jones, Inc., 6005 Euclid Cleveland, O. Est. $50,000.

STREETS AND ROADS

BIDS ASKED

Bids Asked May 9

Minn., Chaska—W. Schimelpfenig Carver Co., Chaska, load, screen and gravel material as required during season. $25,000 (not official). C. P son, Chaska, co. hy. engr.

Minn., Litchfield—G. Hannula, aud. Co., regraveling about 90 mi. roads.

Minn., Preston—C. V. Michener, aud more Co., Preston, crushed rock on 8 mi. Job 44; D4; and 2.5 mi. Job 12.5 mi., Job 44: D1-2; 11 mi. Job 4 $25,000.

N. Y., Brooklyn—President Boro, Boro Hall, Zone 2, permanent on 6 in. concrete repaving Alabama and Lots Aves.

Pennsylvania—State Dpt. Hys., Shroyer, secy., Harrisburg, bituminous surfacing 4.71 mi. from point near ley Stand Corners to Black Ash Co Traffic Route 27, Randalph Twp., Cl Co.; 0.75 mi. Route 35067, Throop Bo and Dickson City, 1.28 mi. Traffic 307, in Scranton, Lackawanna Co.; Li Main and Charleston Sts., West Ave.,

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STREETS & ROADS (Bids Asked, Cont'd.)

Route 6, Traffic Route 660, Rural Route 58042, Wellsboro Borough, Tioga Co.; 7.25 mi., and bituminous on crushed aggregate surfacing 18 ft. wide and rein.-con. bridge, Traffic Route 49, Elkland, Nelson and Lawrence Twps., Elkland Borough, Tioga Co.; 0.2 mi. Traffic Route 45, Lewisburg Borough, Union Co.; 3.94 mi. from point in village of Florence to point 1½ mi. from Allegheny Co. line, U. S. Route 22, Hanover, Smith and Robinson Twps., Washington Co.; concrete base widening, bituminous surfacing new base and existing pavement and bituminous surfacing existing pavement and guttering 0.63 mi. State Park Rd. 7503 and Traffic Route 832, Mill Creek Twp. Presque Isle State Park, Erie Co.; 7.24 mi. from Warren Co. line south towards Tionesta, U. S. Route 62, Hickory and Limestone Twps., Forest and Warren Counties; rein.-con. paving 0.17 mi. S. Fourth St., U. S. Route 309, in Allentown, Lehigh Co.

Bids Asked May 10

•**Minn., Fergus Falls**—W. Lincoln, aud. Otter Tail Co., general regraveling 150 mi., comprising 25,825 cu. yd. gravel surfacing, $25,000. A Glorvigen, co. hy. engr.

Wyoming—State Hy. Comn., J. R. Bromley, supt., Cheyenne, grading, draining, base course surfacing, repairing 8 timber bridges and miscellaneous work 24.65 mi. Gillette-Echeta Coal Mine Access Rd., DA-RM 18 (1), Campbell Co.; grading, draining, base course surfacing, stone chip seal coat and miscellaneous work 2.5 mi. Hanna-Union Pacific Coal Co. Mine Access Road DA-RM 19 (1), Carbon Co.; base course surfacing, base treatment, sand seal coat and miscellaneous work 10.69 mi. Upton-Osage Rd., S.P. 2155, Weston Co.; stone chip seal coat and miscellaneous work 45.339 mi. Evanston-Granger Rd. and 3.875 mi. Urie-Carter Rd., S.P. 2191 and 2192, Uinta Co.; 41-42 mi. Duboil-Diversin Dam Rd., S.P. 2193, Fremont Co.

Bids Asked May 12

Idaho—At Office J. D. Wood, acting comr. P. Wks., Boise, furnishing crushed gravel surfacing and cover coat material in stockpiles adjacent to U. S. 10 alternate between Pack River and Idaho-Montana Line in Bonner Co.; furnishing srushed rock surfacing in stockpiles adjacent to U. S. 95 between Winchester and the Cuidesac grade in Lawis Co. Plans deposit $2 ea. proj.

Bids Asked May 16

★**Ohio**—State Hy. Dpt., Columbus, asphaltic concrete resurfacing 4.907 mi. Sect. Bluffton and G of S.H. 22, U.S. 25, Allen and Hancock Counties, $61,430; 3.462 mi. Sects. K and L-1 of S.H. 22, U.S. 25, Allen Co., $45,700; 5.205 mi. Sects. A, B-1, P, B and Ashland of S.H. Nos. 140 and 144, U.S. 42, Ashland and Richland Counties, $90,560; 1.313 mi. Sect. Bethesda of S.H. Nos. 103 and 295, Belmont Co., $16,200; 0.944 mi. Sect. Yorkville of S.H. 7, Belmont and Jefferson Counties, $9,070; 4.798 mi. Sects. Lisbon and F-1 of S.H. Nos. 12, 82, 368, 382, Columbiana Co., $66,560; 6.281 mi. Sects. A and Coshocton of S.H. 407 and 477, U.S. 36, Coshocton Co., $103,600; 2.112 mi. Sects. Huron, H-2, L-2 and R-1 of S.H. 3, Erie Co., $32,050; 8.988 mi. Sects. E, G, D, M-2, K-1 and J of S.H. 15, U.S. 322, Geauga Co., $152,700; 5.153 mi. Sect. C of S.H. 512, U.S. 30-W, Hancock Co.; 3.66 mi. Sects. Bloomfield and L of S.H. 26, U.S. 22, Jefferson Co., $44,240; 1.33 mi. Sect. J of SH 2, U.S. 20, Lake Co., $28,220; 1.272 mi. Sect. Lorain of SH 3, U.S. 6, Lorain Co., $31,130; 1.614 mi. Sects. Dayton and H of SH 63 and 64, Montgomery Co., $47,130; 6.762 mi. Sects. H and Lexington of SH 334, U.S. 42 and Sects. B and M of SH 202, U.S. 308, Richland Co., $90,870; 5.286 mi. Sects. E and F of SH 164, U.S. 25, Shelby Co., $67,870; 9.514 mi. Sects. D, E, F and Marysville of SH 235, U.S. 33, Union Co.; widening, asphaltic concrete resurfacing 4.167 mi. Sects. D and D-1 of SH 502, Columbiana and Mahoning Counties, $76,400; bituminous treatment 29.03 mi. various hys., Fayette, Franklin and Pickaway Counties, $35,325; 10.971 mi. various sections of SH Nos. 29 and 35, Ross Co., $32,860; grading, draining, concrete paving 0.334 mi. Sect. Toledo of SH 11, U.S. 25, Lucas Co.

Washington—State Hy. Dpt., Olympia, imprv. 4.024 mi. Primary State Hys. 14 and 21, Tidewater Creek to Port Orchard, Primary State Hy. 2, Snoqualmie Pass to Easton, both Kittitas Co.; strengthening portion bridge, over Cowlitz River, Primary State Hy. 5, Lewis Co.; constructing bituminous retread surface sections State Hy. 3, Rosalia Jct. to Belmont, Whitman Co., 4.5 mi. State Hy. 6, Newport to Wolfred, 3.9 mi. State Hy. 6, Cusick north, 3.1 mi. State Hy. 6, Blueside to Tiger, all Pend Oreille Co., 24.8 mi. Primary State Hy. 22, North Star Grange to Fruitland, Lincoln and Stevens Counties; bituminous surfaces on 3.6 mi. Primary State Hy. 5, Alder to Elbe, Pierce Co., 7.5 mi. Primary State Hy. 9, Bogachiel River Rd. to Hoh River, Jefferson Co., 14 mi. Primary State Hy. 13, Cosmopolis to Pacific Co. line, Grays Harbor Co., 7.3 mi. Secondary State Hy. 5-H, Tenino to Yelm, Thurston Co., 13.3 mi. Secondary State Hy. 9-A, Port Angeles to Joyce, Clallam Co., also Secondary State Hy. 9-A, Joyce to Twin, both Clallam Co. B. Bantz, Olympia, hy. dir.

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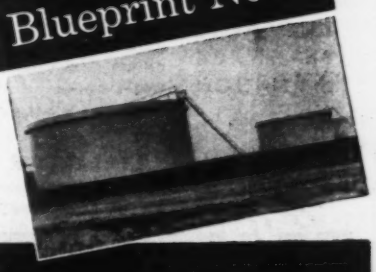
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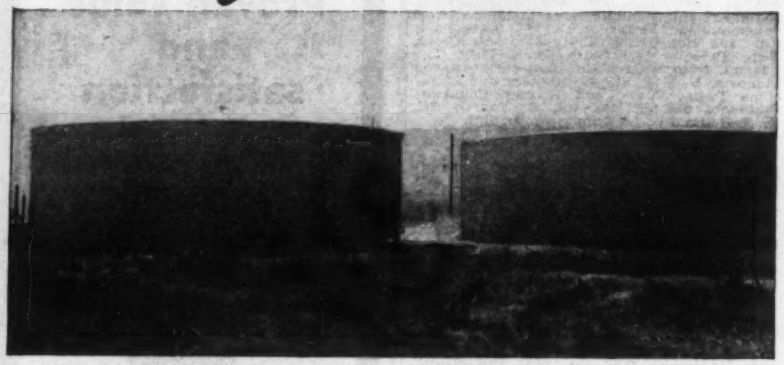

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STREETS & ROADS (Bids Asked, Cl

Alabama—G. R. Swift, dir. State Dpt., Montgomery, grading, drainage, surface treatment with seal, bridge and moval of structures 1.097 mi. Tus Nota-ulga Rd., F.A.P. FAP-267-A(1), Co.; constructing approaches and wi bridge 0.121 mi. F.A.P. SN-FAP-100-B Chilton Co. Plans deposit $10, ea. pr

Bids Asked May 13

Missouri—State Hy. Comn., Jefferson bit. concrete resurfacing and widening mi. road from Sullivan to Fanning Rt 66, Sect. 6; 3.957 mi. same road, Ro Sect. 5; 3.91 mi. same road, Rou Sect. 4; 0.923 mi. same road, Route 66 3, 4.691 mi. same road, Route 66, Se all foregoing Crawford Co.; 0.549 mi. road, Route 66, Sect. 1, Franklin Co. Brown, Jefferson City, engr.

Bids Asked May 15

Ia., Algona—Bd. Supervs. Kossuth maintenance graveling various secon roads, involving 85,000 cu. yd. gravel, 000 units addnl. ½ mi. haul, 9,000 s pit stripping. Over $25,000. H. M. Algona, co. engr.

Bids Asked May 17

California—State Dpt. Hys., G. T. M engr., Sacramento, constructing unc rock base borders, placing plant mix existing surface, applying seal coat 11.7 mi. between Oil King School and Rd. and between Hub and 46 mi. nor Fresno Co., 5.6 mi. between 0.8 mi. w Pennington Creek and Morro Bay, San Obispo Co.

Minn., Crookston—H. J. Welte, and Co., Crookston, graveling, crush, scree load 25,000 cu. yd., 2,500 cu. yd. stoc 375,000 cu. yd. mile haul. $25,000. Harding, Crookston, co. hy. engr.

Bids Asked May 18

California—G. T. McCoy, engr. State Hys., State Bldg., Los Angeles, ca asphaltic concrete surfacing 1 mi. in Burbank between Buena Vista St. and city limits, Los Angeles Co.

Minnesota—State Hy. Dpt., St. Paul plying 5,059,700 gal. bituminous materi Maintenance Dists. 1, 2, 3, 4, 5, 6, 10, 11, 13, 14 and 16; applying 1,6 gal. bituminous seal coat material on mi. roads, in Maintenance Dists. 1, 6, 8, 15, 16, 9, 10, 11, 13, 14, and 12, $25,000.

Bids Asked May 19

Kentucky—Dpt. Hys., Frankfort, bi ous resurfacing 5.207 mi. 13 St. in Ar U.S. 60, Louisa St., and Catlettsburg Rd., in Catlettsburg, SN-SP 10-45; SP SP 10-105; SN-SP 10-165, Boyd Co. mi. London-Manchester Rd., SP 63-51, Co.; rock asphalt seal surfacing 12. Columbia-Somerset Rd., SP 1-70, SP Adair and Russell Counties; 3.816 mi. ville-Harrodsburg Rd., SP 11-20, Bou 11.381 mi. Liberty-Jamestown Rd., SP SP 104-18, Casey and Russell Counties mi. Cadiz-Eddyville Rd., SP 111-14, Co.; 6.284 mi. Bowling Green-Scottsv SP 114-163, Warren Co.; 1.134 mi. U.S. through Williamsburg, SN-SP 118-100, ley Co.; 8,320 tons Class F surfacing mi. Hopkinsville-Lafayette Rd., P. 24 7.375 mi. same road, P. 24-205-B, same road, P. 24-1205-C, 1.297 mi. Ho ville-Elkton Rd., P. 24-65-C, all foregoing Christian Co.; 16,490 tons, 15.333 mi. renceburg-Bardstown Rd., P. 3-111-B, mi. Alton-Frankfort Rd., P. 3-31-A, mi. Lawrenceburg-Harrodsburg Rd. 3-2091-D, foregoing Anderson Co., 6 Frankfort-Alton Rd., P. 37-5085-P, 1 same road, P. 37-35-G, 6.281 mi. Fra Georgetown Rd., P. 37-25-A, foregoing Franklin Co., 3.134 mi. Versailles-Lawburg Rd., P. 120-135-A, 2.224 mi. same P. 120-135-B, both Woodford Co.; 1,6 11.347 mi. Forks-Marrowbone-Elkhorn Rd., P. 98-223-A, 1 mi. same road, 1223-B, 1.996 mi. Elkhorn City-Shelb Rd., P. 98-1263-A and 98-263-E, 4. Marrowbone-Hellier Rd., P. 98-243-A, ing Pike Co.; 9,190 tons Class C-1 su F surfacing 2.337 mi. Central City-boro Rd., P. 75-202-A, 4.12 mi. Beech Owensboro Rd., P. 75-422-A, and 1.5 Beech Grove-Rangers Landing Rd., 4-2-A, all McLean Co., 5.432 mi. City-Owensboro Rd., P. 89-263-A, berg Co., 6.5 mi. Owensboro-Beech Rd., P. 30-177-D, Daviess Co.; 7,49 9.603 mi. Foree's Corner-Lanes Landi P. 52-47-C, and 9.825 mi. New Cas phur Rd., P. 52-307-A, Henry Co. tons, 13.411 mi. Williamstown-Jones P. 41-94-F, 0.227 mi. same road, P. 4 D. both Grant Co., 9.393 mi. Cyn Williamstown Rd., P. 49-172-C, Bo Co.; 6,970 tons, 1.469 mi. Russell-Wo ton Rd., P. 45-11-A, Greenup Co. 4 street in Catlettsburg, P. 10-3065-D, Catlettsburg-Kavanaugh-Louisa Rd., 85-B, both Boyd Co., 5.179 mi. Tol Mt. Carmel Rd., P. 68-94-B, Lewis Co. mi. Flemingsburg-Vanceburg Rd., P. E. Fleming Co.; 10,290 tons, 4.375 mi. side-Monticello Rd., P. 100-155-D, Co., 16.177 mi. Monticello-Burnside 116-2019-A and 116-19-B, 2.509 mi. cello-Albany Rd., P. 116-2099-D, 116-39-E, 116-22119-A, and 116-119-E,

TS & ROADS (Bids Asked, Cont'd.)

Co., 1,000 tons Class F or Class I 8.763 mi. Greenup-Ashland Rd P. and 1.85 mi. Russell-Simmington 46-111-C, both Greenup Co.; 410 .414 mi. Russell Cave Spur, P. Fayette Co.; 7,430 tons Class C-1 sur- 7.602 mi. Liberty-Campbellsville Rd., 121-A and 23-121-D, 7.66 mi. Liberty- Rd., P. 23-21-C, 10.194 mi. Liberty- ville Rd., P. 23-1-B, 0.542 mi. same 23-1001-A, 5.5 mi. Liberty-Russell Rd., P. 23-51-D, all foregoing in Co.

Bids Asked

Newport—P. Wks. Dpt., City Hall, 10 streets. $130,000. Charles A. & Assoc., 1515 Turks Head Bldg., ngrs.

BIDDERS

rnia—State Div. Hys., Sacramento, Imprv. 21.8 mi. Modoc Co., from ray Constr. Co., P. O. Box 873 Sac- $95,653***8.3 mi. San Luis Obispo m Granite Constr. Co., Box 900, ville, $49,700***6.7 mi. Tulare Co., Brown, Doko & Baum, Dolliver St., Beach, $82,655***7.3 mi. Madera Co., J. Ruddy & Son, P. O. Box 1122, , $41,543. CD 4/11—ENR 4/13.

a—State Hy. Dpt., Atlanta, Apr. 21, 2.27 and 7.7 mi. Montgomery Co., ardaway Contg. Co., 15 11 St., Col- $36,536. CD 4/19.

ucky—State Dpt. Hys., Frankford, 28, imprv. 22.559 mi. Ballard and ken Counties, and 9.543 mi. Union m White Consolidated, Inc., 1735 lerton Ave., Chicago, Ill., $192,919 1.223 respectively***8.32 mi. Campbell m R. B. Tyler, 1446 Levering St., le, $32,438***1.423 mi. Fayette Co., Lehman-Roberts Co., 615 Citizens ldg., Lexington, $27,783***18.061 mi. Co., and 19.121 mi., Grayson Co., ally & Mudd, Springfield, $75,136 and respectively***1.7 mi. Jefferson Co., eo. M. Eady Co., 340 Byrne St., le, $27,770. CD 4/10—ENR 4/13.

a—State Hy. Comn., Indianapolis, Imprv. 41.68 mi., Morgan, Hen- and Clay Counties from Bituminous a Co., Inc., 34 St. and Ft. Harrison erre Haute, $67,441, est. $78,686*** t. Brown, Bartholomew, Decatur, n, Scott and Clark Counties and t. Wabash, Miami, Fulton, Whitley, o and Huntington Counties, from ett Co., 511 Shepherd St., Lockland, 3 and $65,674 respectively, est. and $72,246 respectively***65.48 mi. Marshall, Porter, Cass, Fulton and Counties, from Rock Road Constr. 5 N. Rogers St., Chicago, Ill., $85,- 95,428***17.272 mi. Tippecanoe and Counties, from L. Walker Fauber, O., $57,363, est. $87,974. CD 4/4, 4/7— 6, 4/13.

eveland—Cuyahoga Co., F. Husak, r. 21, resurfacing Rockside Rd. from w to Broadview Rds., from Allied Keith Bldg., $35,028. Est. $35,400. J. Williams, Standard Bldg., co. engr.

sylvania—State Dpt. Hys., Harris- Apr. 28, imprv. 5.87 mi. Duphin anon Counties, from Union Bldg. r. Corp., 631 Main Ave., Passaic, 17,910, 2.42 mi. Lebanon Co., from Bros., Camp Hill, $366,386. CD 4/19.

sylvania—Office J. U. Shroyer, Secy. e Hy. Dpt., Harrisburg, Apr. 27, 12,073 ft. Sect. 1-A, Dauphin Co., s. Julian, S. Du Pont Rd., Elsmere, ton, Del., $402,525; 90,258 ft. Sect. uphin Co., from Buffalo Gravel Corp., l. $717,308. CD 4/19.

lvania—State Hy. Dpt., Harrisburg, t. 60047, Cornplanter and Oil Creek Venango Co.; from Allegheny As- Paving Co., 4111 Blvd. of Allies, gh, $167,884***Rt. 74, Sec. 4, RR. t. 2-R, T. R. 13 and 518, Sharon, Co., from Kelley & Meyer, Co., 522 Bank Bldg., Youngstown, O., $25,956 New Milford Boro, New Milford at Bend Twps., Susquehanna Coun- m Surburban Constr. Co., P. O. Ardmore, $53,929.

Houston—City, Apr. 19, asphalt Jenson Dr., Rusk Ave., etc., from ulfhic Co., 3320 Polk St., $29,192. ,000.

ACTS AWARDED

nia—State Div. Hys., G. T. McCoy, . Wks. Bldg., Sacramento, imprv. Merced Co., to M. J. Ruddy, P.O. 2, Modesto, $124,476. CD 4/13—ENR

Richmond—Richmond Bd. Educ., ell Ave., rough grading south por- Cerrito High School grounds, to C. De Velbiss, Eastshore and Hunting- , $41,215. CD 4/4—ENR 4/6.

Fort Miles—U. S. Eng., Penn Mutual and Walnut Sts., Phila. Pa., recon- roads, Contr. 36 109-Eng-403, to & Lynch, Delaware Trust Bldg., ton, $54,427.

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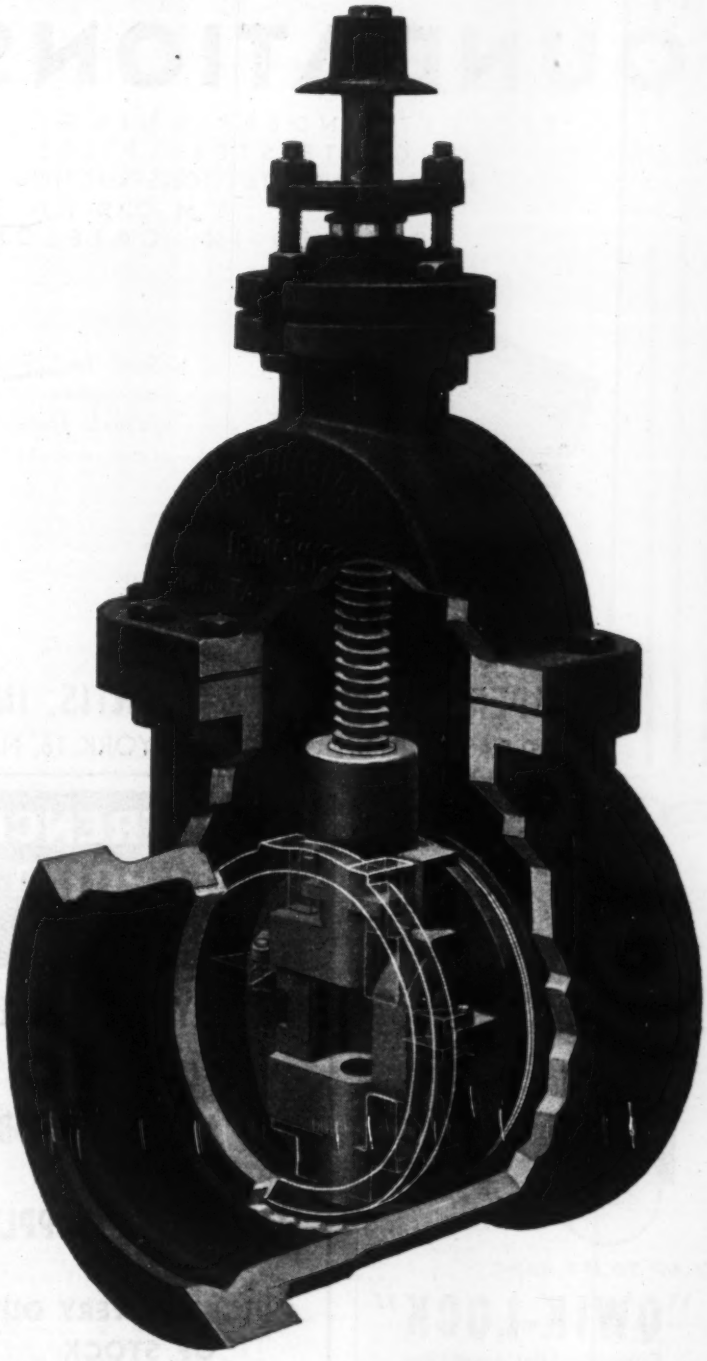

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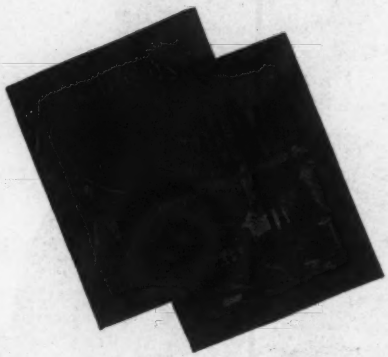

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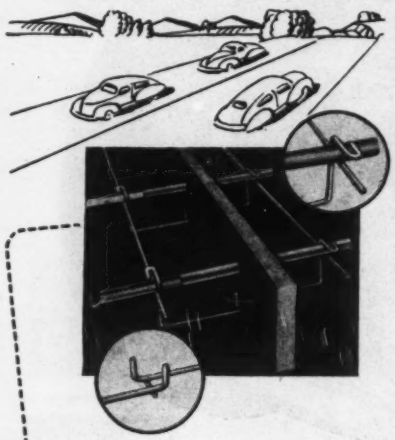

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STREETS & ROADS (Contracts Awarded Cont'd.)

Florida — State Rd. Dpt., Tallahassee, imprv. 10.181 mi. Brevard Co., to Tyler Co., 1446 Levering St., Louisville, $32,253; 34.461 mi. Hamilton and Levy Counties, to Hall & Caddell, Box 2217, Jacksonville, $74,973. Bids 4/25. CD 4/13.

Georgia—State Hy. Dpt., Atlanta, 6.651 mi. Bibb Co., to Warren Bros. Co. 38 Memorial Dr., Cambridge, Mass., $41,252***13.223 mi. Coffee Co., to Constr. Co., Thomasville, $53,52?***; Butts Co., to Henry Newton & Co., Decatur, $34,310***12.417 mi. Mitchell Co., to Cobbell Contg. Co., 1312 10 Ave., Columbus, $31,345***7.986 mi. Talbot Co., to E. Smith, Hurt Bldg., Atlanta, $51,29?***; mi. Liberty Co., to C. M. Lyle Contr., Gainesville, $50,090***4 and 7 mi. Jefferson Co., to Sam Finley, Inc., 292 North N.W., Atlanta, $61,683***3.3 mi. and Jefferson and Washington Counties, to W. Ledbetter, Rome, $36,877***, Grand $360,386. Bids 4/21. Rejected bids A imprv. 5.14 mi. Houston Co. CD 4/13.

Ia., Boone—Bd. Supervs. Boone Co. facing various secondary roads, to Constr. Co., Webster City, $42,924. Bids awarded 4/24. CD 4/11—ENR 4/13.

Mich., Dearborn—Wayne Co. Rd. 3800 Barlum Tower, Detroit, imprv. Hill Rd., to Julius Porath & Son, 70? portation Bldg., Detroit, $46,721. CD ENR 4/13.

Minn., Rochester—Olmsted Co., P derleak, aud., imprv. 3 mi. S.A.R. S.A.R. 10 and East Co. line, Job 2 mi. from U.S. Hy. 63 east 1¼ S.A.R. 11 west ¼ mi., Job 4104, to Rochester, $49,015. Bids 4/13.

O., Cleveland—Cuyahoga Co., Husak, clk., Court House, resurfacing Cedar Rd. between Taylor and rensville Center Rds., to Horvitz Co., land Bldg., $46,972, est. $52,400. Bids J. O. McWilliams, Standard Bldg., ca

★**Pennsylvania**—State Dpt. Hys., burg, crushed aggregate base widening existing pavement and bitu surfacing 1.43 mi. U. S. Route 119 a 6 mi. north of Indiana to point n intersection of Traffic Route 11 Twp., and 3.26 mi. Traffic Route 1 Valley Twps., between Homer Ci Armagh, both Indiana Co., to Harsa atr. Co., Inc., 1101 Western Ave., burgh, $67,324 and $134,236 respectiv concrete base course widening 1 Traffic Route 53 between Kylerto Allport, Morris and Cooper Twps., C Co., to L. M. Owen, Johnstown, $ bituminous resurfacing 3.39 mi. Route 58, from Borough of Mercer towards Delaware Grove, Coolspri Jefferson Twps., Mercer Co., to Ne Duntile Co., New Castle, $62,212***, Traffic Route 38, from Venango-Clar line at Mariasville north to intersect U. S. Route 322, Richland and Ri Twps., Venango Co., to The Baldwin Paving Co., Union Commerce Bldg., land, 14, O., $154,744. Grand total $

West Virginia—State Road Charleston, imprv. 19.2 mi., Marion J. M. Francesa & Co., Fayetteville, Bids 4/18. Rejected bids Apr. 18, 3.403 mi. Nicholas Co. CD 4/7—ENR

Ont., Cobourg—Northumberland Co., MacNachton, clk., road reconstruction labor. $50,000. A. S. Miller, County engr.

Ont., Malton—Toronto & York Comn., 57 Adelaide St. E., Toronto crete paving 2 mi. Malton Rd., Conty to A. E. Jupp Constr. Co., Ltd., 56 Ave., Toronto, approx. $90,000. H. C c/o owner, engr. CD 4/19.

Ont., St. Catherines—Lincoln Co., Millward, clk., 2 Mamora St., Impr rittville Hy., day labor. $35,000. P County Bldg., engr.

Ont., Toronto—Asphaltic concrete Runnymede Rd., to Warren Bitumuls ing Co. Ltd., 1454 Bloor St. W., $7. C. Harris, c/o City, engr.

Ont., Welland—Municipality, J. D city clk., paving Niagara St., widen surfacing Wartime Housing Rd., w imprv. Hellems Ave., day Labor. C. P. Coulson, Town Hall, engr.

EARTHWORK, WATERW

PROPOSED WORK

Ark., Arkadelphia—Clark Co. Flo trol Com., S. E. Simonson, chn., A phia, drainage work in Terre Noir reclamation project, $80,000.

†**Md., Bainbridge** (sta. Port Dep Yards & Docks, Navy Dpt., 18 St. a stitution Ave. N.W., Wash., 25, D. C intake, Naval Training Station, Nor

†**Md., Patuxent River** (br. Wash. Yards & Docks, Navy Dpt., 18 St. a stitution Ave. N.W., Wash., 25, D.C. vation and dredging, Naval Air Statio 9116.

…WORK, WATERWAYS (Proposed … Cont'd.)

Solomons (br. Wash. D.C.)—Yards & … Navy Dpt., 18 St. and Constitution …W., Wash., 25, D.C., bulkhead and … Naval Air Station, NOY 9115.

… Tulsa—U. S. Eng., 416 Wright … Tulsa, Zone 2, bank levee protection on … River, Sec. A, Sol. 34-066-S-44-97.

Halifax—Province of Nova Scotia, … Dpt. P. Wks., Halifax, engrs.

Wolfville—Secy. Dpt. P. Wks., Ot… …nt., repairing dikes. $300,000.

Bradford—B. B. Collings, Bradford, … approx. 240 acres marshland, con… … 3 mi. outside canal, 6 ft. deep … ft. wide, and tributary canals.

Kitchener—Municipality, imprvs. at … Creek. $25,000. S. Shupe, City Hall,

Sorel—Dominion Govt., Ottawa, Ont., … Richilieu Canal between St. Lor… …ver, here, and Lake Champlain. Dpt. … Ottawa, Ont., engr.

…SKED

Bids Asked May 20

…—At office Bureau Reclamation, … House, Denver, Colo., furnishing, … cars at shipping point or f.o.b. … Home, one 15.25x30 ft. fixed… …ts hoist with stem carriages and … pump, equip., 1 lot of pipe, … fittings, for installation in out… …s at Anderson Ranch Dam, Boise … Spec. 1734-D. S. O. Harper, ch.

…ACTS AWARDED

Pine Bluff—U. S. Eng., 300 Bway., … Rock, repairing Plum Bayou levee, … & Evans, 115 N. Spring St., Little …,585. Est. $70,000.

… Alameda—Yards & Docks, Navy … St. and Constitution Ave. N.W., …, D.C., rock seawall Naval Air … NOY 9435, to Macco Constr. Co., … and Ferry Sts., Oakland, $273,650.

… Oakland—Yards & Docks, Navy … St. and Constitution Ave. N.W., …, D. C., dredge repair, NOY 9710, … Constr. Co., Box 6, San Pedro,

… Camden—South Jersey Port Comn., … St., dredging 100,000 cu. yd. Dela… …er, at Camden Marine Terminal, to … Dredging Co., 12 S. 12 St., Phila., …. Awarded 4/20.

…oma—U. S. Eng., 231 W. Main St., … Tex., relocating pipeline, Contr. 41… …-146, Denison Dam and Reservation, … and Marshall Counties to Warren … Corp., Natl. Bank Bldg., Tulsa,

UNCLASSIFIED

…SED WORK

… Hunters Point — DRYDOCKS — … Docks, Navy Dpt., 18 St. and Con… … Ave. N.W., Wash., 25, D. C., archi… … and engineering services by Huber …k, 1 Montgomery St., Stn Francisco, …a.

… St. Petersburg—RUNWAYS—Yards … Navy Dpt., 18 St. and Constitution … W., Wash., 25, D. C., architectural …neering services by Bail, Horton & … Box 269, Jacksonville, exten. … NOY 9645.

…—ELECTRIC LINES—McDonough … Co-operative, Macomb, 45 mi. rural … $50,000 REA allot.

…orm Lake—AIRPORT—City, F. W. … mayor, plans $45,000 bond election, … airport. $70,000. CD 1/13/43— …21/43.

… Huxie—OIL WELLS, etc.—Conti… …al Oil Co., Ponca City, Okla., devel… …pprox. 20 deep test oil wells, stor… …ilities. $1,000,000.

…ashington—OIL WELL—Texas Co., …a, developing oil well, storage fa… …at Krotz Springs. Over $26,000.

…land—FACILITIES—Yards & Docks, …Dpt., 18 St. and Constitution Ave. …ash., 25, D. C., addnl. facilities, … Point, NOY 8992.

… Bainbridge (sta. Port Deposit)—…G FACILITIES—Yards & Docks, …Dpt., 18 St. and Constitution Ave. …ash., 25, D. C., seaplane docking … N A T S, NOY 8656.

… Cumberland — AIRPORT — Civil …nautics Admin., La Guardia Field, … Heights, N. Y., airport construc… …el. 1,600,000 cu.yd. grading, 16,000 … drainage, paving, etc. in abeyance. … CD 3/13—ENR 3/16.

Patuxent River (br. Wash., D. C.) …STATION BLDGS., etc.—Yards & …Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., ships service store addn., NOY 9215, workshop and transfer station, NOY 9119; scrub decks, NOY 9224; boat maintenance facilities, NOY 9218; boat house and pier, NOY 9281, all at Naval Air Station.

Missouri — ELECTRIC LINES — Lewis County Rural Electric Assn., Monticello, 148 mi. electric lines, Clark, Knox, Lewis and Shelby Counties. $150,000 REA allot.

Mo., Maryville—AIRPORT—City, L. B. Campbell, mayor, $70,000 bond election, May 9, municipal airport. $150,000. Will apply to CAA.

†N. J., Newark—AIR BASE BLDGS.—U. S. Eng., 120 Wall St., New York, 5, N. Y., military bldg. addns., alterations, Army Air Base. $125,000.

N. J., South River and **Sayreville**—GAS MAINS—Pub. Serv. Gas & Electric Co., 80 Park Pl., Newark, two 240 ft. 8-in. steel submarine gas mains across South River. Over $28,000.

†N. Y., Jackson Heights—AIRPORT BLDG.—U. S. Eng., 120 Wall St., New York, Zone 5, bldg. to handle army postal services facilities at North Beach Municipal Airport. $31,000.

†R. I., Charleston—AIR FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., architect-engineer services by S. McEllsworth, 12 Pearl St., Boston, Mass., addnl. services Naval Auxiliary Air Facility.

†Tex., Ellington Field—FUELING SYSTEM FACILITIES—U. S. Eng., Santa Fe Bldg., Galveston, A. C. fueling sys. facilities, etc. Sol. 41-243-44-C176.

Tex., Freeport — DOCK — Dow Chemical Co., Freeport, and M. & M. Bldg., Houston, dock, incl. barge landing dock, steel sheet pile bulkhead, dolphins, etc. Over $40,000.

Tex., George West (at Fant City) — OIL WELL—Henry Coquat, Milam Bldg., San Antonio, developing deep test oil well. Over $25,000.

★**B. C., Vancouver**—WHARF, etc.—Dpt. National Defense (Sea), Ottawa, Ont., naval stores wharf and warehouse where second Narrow's Bridge joins North Shore. $2,500,000.

★**Que., Quebec City**—RURAL DISTRIBUTION LINES—Province of Quebec, Quebec City, rural distr. lines. Voted $10,000,000. Quebec Hydro-Electric Comn., 107 Craig St. W., Montreal, engrs.

BIDS ASKED

Bids Asked May 8

N. Y., New Dorp (Sta. Staten Island)—ATHLETIC FIELD GRADING, etc.—Superintendent School Bldgs., Design & Construction, 49 Flatbush Ave. Exten., Brooklyn, Zone 1, temporary grading and surfacing Schemes A and B, on site of proposed New Dorp High School Athletic Field, on blocks bounded by Allison Ave., Colgate Pl., Connor Blvd. and 10 St. Plans deposit $1.

Bids Asked May 11

N. Y., Brooklyn—PLAYGROUNDS—Comrs. Parks at office Dpt. Parks, Arsenal, Central Park, 64 St. and 5 Ave., New York, Zone 21, playground, Sumner Ave., Madison and Monroe Sts., Contr. B-216-144; general park development, demolition structures, etc., playground between Monroe and Madison Sts., west of Ralph Ave., Contr. B-224-144.

Bids Asked May 13

†Calif., Moffett Field—HANGAR, etc.—National Advisory Com. for Aeronautics, Ames Aeronautical Laboratory, hangar and shop bldg.

†Tenn., Memphis—AIR STATION RECREATIONAL FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash. 25, D. C., recreational facilities, Naval Air Technical Training Center, Hanker-Heyer, 1036 Commerce Title Bldg., archts.

Bids Asked May 16

†D. C., Wash.—PARKS—Pub. Rds. Admin., 18 and F Sts. W.W., Wash., 25, Proj. 5B6, national parks on Mt. Vernon Memorial Hy. Plans deposit $10.

Bids Asked About May 8 to 18

Mass., Braintree—ATHLETIC FIELD—Bd. Selectmen, H. Higgins, Town Hall, enclosed all sports field, Hollis Field, $25,000. CD 4/13—ENR 4/20.

Bids Asked May 25

†Md., Patuxent River (br. Wash. D. C.)—RAILROAD FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., railroad facilities, Naval Air Station, NOY 9221.

Bids Asked July 1

†Maryland—CATAPULT—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., Type H mark catapult, Webster Field, Priests Point, NOY 9214.

LOW BIDDERS

†Calif., Hawthorne—APRON EXPANSION—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, Apr. 25, apron expansion at Hawthorne Municipal Airport, No. 577, from Bonadiman-McCain, 1709 W. 8 St., Los Angeles, $58,035. CD 4/19.

Colorado — RURAL ELECTRIFICATION LINES—San Luis Valley Rural Cooperative, Monte Vista, Apr. 25, 88 mi. reconstructing of line from single phase to 3-phase; 33 mi. new 3-phase line and service to 114 irrigation wells, from R. N. Campsey Co., 2520 Leyden St., Denver, $139,150. C. C. Cocks, 619 Oliver-Eakle Bldg., Amarillo, Tex., engr.

★**†Ore., Port Orford** — AIRPORT — Civil Aeronautics Admin., Smith Tower Annex, Seattle, 4, Wash., Apr. 22, airport, from R. E. Rush & G. F. Baird, Port Angeles, Wash., $535,878. CD 3/29—ENR 4/6.

†Tex., Camp Hood—FIRING RANGES, etc.—U. S. Eng., Fort Sam Houston, firing ranges, etc., from D. Word, P. O. Box 330, New Braunfels, $103,275. CD 4/26.

†Tex., Camp Hood—RANGES—U. S. Eng., Fort Sam Houston, Apr. 24, ranges, Spec. 1107, from D. Word, P. O. Box 330, New Branfels, $103,276.

†Wyo., Casper—AIRBASE BLDG.—U. S. Eng., Lowry Field, Colo., Apr. 21, 1 story, 96x150 ft. motor repair shop, Airbase, from Rognstad-Olsen Co., Casper, $34,455. Est. $40,000.

CONTRACTS AWARDED

†California—RADIO TRANSMITTER FACILITIES, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., radio transmitter facilities, etc., Naval Auxiliary Air Station at Vernalis, Crows Landing, Santa Rosa, Monterey, Hollister and Watsonville, NOY 8908, to Scott Buttner Electric Co., 534 20 St., Oakland, $75,500. CD 1/28.

†Calif., Alameda—RAILROAD HOLDING YARD—U. S. Eng., 74 New Montgomery St., San Francisco, railroad holding yard, Alameda Intransit Depot, Spec. 1386-2, to A. D. Schader, 144 Spear St., San Francisco, $52,366.

★**†Calif., Alameda**—AIR STATION BARRACKS, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., barracks, bachelor officers' quarters, and seaplane hangar fdns., Naval Air Station, NOY 9463, to Stolte, Inc., 8451 San Leandro Ave., Oakland, Calif., $1,423,000.

†Calif., Benicia—EXPLOSIVES HOLDING YARD—U. S. Eng., 74 New Montgomery St., San Francisco, explosives holding yard at Benicia Arsenal, Spec. 1333, to Frederickson Bros. Constr. Co., 1259 65 St., Emeryville, $330,181. CD 2/8—ENR 2/10.

†Calif., Benicia—STORAGE YARD HARD STANDING—U. S. Eng., 74 New Montgomery St., San Francisco, lumber storage yard hard standing, Proj. S, Spec. 1396-2, to Parish Bros., 619 H. St., Sacramento, $69,387.

†Calif., Culver City—AIRFIELD BLDGS., etc. — U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, new bldgs., addns., alterations, appurtenant work, 1st Motion Picture Unit, Army Airfield, Contr. 04-363-Eng-576, to I. M. Wells, 201 W. Linden Dr., Beverly Hills, $87,963.

†Calif., Fort Mason—BOAT MOORINGS—U. S. Eng., 74 New Montgomery St., San Francisco, small boat moorings at Aquatic Park, Spec. 74X-P-2-1, to J. D. Proctor, Inc., P. O. Box 247, Point Richmond, $35,014.

†Calif., Mare Island—NAVY YARD ALTERATIONS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., addnl. alterations, Navy Yard, NOY 8837, to M. J. Ding, Inc., 231 Franklin St., San Francisco, Zone 2, $90,842.

†Calif., Muroc—AIRFIELD CONSTRUCTION—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, addnl. army airfield construction, No. 557, to C. B. Stratton Constr. Co., 3537 E. Colorado Blvd., Pasadena, $32,848. Bids 4/10.

†Calif., Muroc Air Base—FUELING SYSTEM—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, addnl. fueling sys., Contr. 04-353-Eng-503, to J. A. Klarquist, 618 S. Western Ave., Los Angeles, $26,174.

†Calif., Palm Springs—HANGAR, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, Zone 14, maintenance hangar, utilities, paving, No. 465, to C. B. Stratton Constr. Co., 3537 E. Colorado Blvd., Pasadena, $60,448. Bids 2/7.

†Calif., San Diego—ENGINE TEST CELLS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., modernization engine test cells, Naval Air Station, NOY 8093, to Baruch Corp., 625 Olive St., Los Angeles, Zone 14, $296,740.

†Calif., San Francisco—FINGER PIERS—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., finger piers, Section Base, NOY 7757, to Mercer-Fraser Co., 83 McAllister St., $421,990.

†Calif., Stockton—SPRINKLER SYSTEM—U. S. Eng., 1209 8 St., Sacramento, Zone 3, automatic sprinkler sys., Stockton Ordnance Depot, Spec. 882, to M. R. Carpenter, 907 Front St., Sacramento, $41,960.

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UNCLASSIFIED (Contracts Awarded, Cont'd.)

†**Fla., Jacksonville**—GUNNERY TRAINING FACILITIES—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., gunnery training facilities, Naval Air Station, NOY 8839, to Southern States Constr. Co., Congress Bldg., Miami, **$110,236.**

†**Fla., Pinecastle**—AIRFIELD BLDG., etc.—U. S. Eng. 575 Riverside Ave., Jacksonville, Zone 2, bldg., facilities, electric distr. sys., etc., Army Airfield, Contr. 08-123-Eng-347, to Clarson & Mills, St. Petersburg, **$67,922.**

†**Ga., Robins Field (br. Macon)**—AIRFIELD BLDGS., etc.—U. S. Eng., Post Office Bldg., Savannah, addn. to bldg. and utility, Contr. 09-133-Eng-170, to Laxton Constr. Co., Inc., P. O. Box 2114, Charlotte, N. C., **$64,000.**

†**Idaho, Malad City** — AIRPORT — Civil Aeronautics Admin., Smith Tower Annex, Seattle, 4, Wash., airport, to C. E. Nelson, Logan, Utah, **$130,456.** Bids 4/4. CD 3/29—ENR 4/6, under LB.

†**Md., Patuxent River (br. Wash. D. C.)**—AIR STATION BLDG., etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., laundry bldg. and drying area, Naval Air Station, NOY 9224, to John A. Johnson Constr. Co., 811 National Press Bldg., Wash., D. C., **$132,847.** CD 4/26.

†**N. J., Camp Kilmer (br. New Brunswick)**—AMPHITHEATRE—U. S. Eng., 120 Wall St., New York, 5, N. Y., outdoor amphitheatre, to Gumina Bldg. & Const. Co., 14 Georges Rd., New Brunswick, **$35,754.** Bids 4/20.

†**N. J., Millville**—AIRPORT BLDGS.—U. S. Eng., Penn Mutual Bldg., 6 and Walnut Sts., Phila., Pa., prefabricated warehouse bldg., parachute bldg., and paint shop, at Millville Airport, to Costanza Constr. Co., 5328 Sherwood Terrace, Merchantville, **$129,184.** Bids 4/24. CD 4/21.

†**N. J., Woodbine** — CLEARING, etc. — Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., clearing, grubbing Outlying Field, NOY 9295, to O. Hansen, 7215 Atlantic Ave., Ventnor City, **$110,194.**

†**N. Y., Newburgh**—AIRFIELD BLDGS.—U. S. Eng., 120 Wall St., New York, Zone 5, utility bldgs., U. S. Military Academy, Stewart Field, Contr. 30-075-Eng-1012, to C. G. Flygare, Inc., 238 E. 47 St., New York, **$49,849.** Bids 4/4. CD 3/31, under Public Bldgs.

†**N.C., Bluethenthal Field (P.O. Wilmington)**—FACILITIES—U. S. Eng., 308 Customhouse, Wilmington, addnl. facilities, Contr. 31-075-eng-137, to L. B. Gallimore, Greensboro, est. **$120,805.**

†**N.C., Winston-Salem**—TAXIWAY—U.S. Eng., 308 Customhouse, Wilmington, taxiway, Contr. 31-075-eng-138, Smith Reynolds Airport, to V. P. Loftis Co., Builders Bldg., Charlotte, est. **$96,245.**

†**O., Wright Field (br. Dayton)**—AIRFIELD BLDGS.—U. S. Eng., Dayton, bldg. addn. Contr. 33-046-eng-111, to Hillsmith & Co., 124 E. 3 St., Dayton, **$31,936;** tower and storage bldg., Contr. 33-046-eng-112, to J. L. Simmons Co., Inc., 710 Union Title Bldg., Indianapolis, Ind., est. **$47,556.**

Oklahoma—FARM CONNECTIONS—Kiwah Elec. Cooperative, Inc., Cordell, 195 mi. farm connections, Washita Co., to Walco Constr. Co., 2408 E. 4 Pl., Tulsa, **$159,640.** CD 3/13—ENR 3/23.

Okla., Cordell—RURAL ELECTRIFICATION LINES—Kiwah Elec. Cooperative, Inc., Cordell, 150 mi. rural electrification lines, Washita and Beckham Counties, to Federal Engineering & Const. Co., Blue Ridge and Old 40 Hy., Kansas City, Mo., **$121,000.** C. H. Guernsey & Co., Cherokee, engrs.

Okla., Custer City—OIL WELL—W. J. and F. G. Fox, et al, Custer City, developing 9,500 ft. test oil well, to Johnson & Flesher Drilling Co., Custer City, over **$30,000.**

★†**Pa., Middletown**—TEST CELLS—U. S. Eng., Middletown, 16 addnl. test cells at Middletown Air Depot, to John W. Ryan Const. Co., Inc., 369 Lexington Ave., New York, N. Y., **$519,700.** CD 4/12—ENR 4/20 under LB.

†**Pa., Phila.**—TURFING, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D.C., turfing, dustproofing Western Field, NAMC, NOY 9292, to Wm. F. Gordon Co., Bala-Cynwyd, **$25,692.**

Texas—OIL WELLS—Sun Oil Co., Esperson Bldg., and Navarro Oil Co., 7172 Lawndale, Houston, developing 3 new test oil wells at Beeville and Shepherd to Brewster-Bartle Drilling Co., Esperson Bldg., Houston, over **$50,000.**

Tex., Freer—OIL WELL—Texas Co., 720 San Jacinto St., Houston, developing 6,500 ft. test oil well to Newman Bros. Drilling Co., Milam Bldg., San Antonio, over **$25,000.**

Tex., Ganado—OIL WELLS—W. Stewart Boyle, State National Bank Bldg., Houston, developing 2 deep test oil wells, own forces. Over **$50,000.**

Tex., Randado—OIL WELL—Sun Oil Co., Esperson Bldg., Houston, developing [illegible] ft. test oil well to Newman Bros. Drilling Co., Milam Bldg., San Antonio, over [illegible]

Tex., Realitos—OIL WELL—Argo Oil Corp., Realitos, developing 6,000 ft. test oil well, to Newman Bros. Drilling Co., Milam Bldg., San Antonio, over **$25,000.**

Tex., Tilden—OIL WELL—Atlantic Refining Co., Esperson Bldg., Houston, developing 7,000 ft. test oil well, to Lone Star Drilling Co., Tilden, over **$25,000.**

†**Utah, Hill Field (P. O. Ogden)**—FILTERED AIR SYSTEM—U. S. Eng., 324 25th St., Sacramento, 8, Calif., filtered air system, Ogden Air Depot, Solic. No. 876, to [illegible] Co., Kiesel Bldg., Ogden, **$24,633.**

†**Wash., Pasco**—RUNWAYS, etc.—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D. C., runways, seal coat surfacing, Naval Air Station, NOY 9692, to S. Birch & Sons Constr. Co., Great Falls, Mont.

Alta., Taber—OIL WELL—Major Oils Ltd., c/o H. P. Green, 372 Bay St., Toronto, developing oil wells, 4½ mi. west of Dominion Nassau oil wells, to Newell & Cutler, c/o owner. **Est. $60,000.**

B. C., Esquimalt—DOCKYARD BLDGS.—Dpt. Natl. Defense for Sea, Ottawa, workshop, etc., H.M.C. Dockyard, to Shockley, Admiral Rd., Victoria, [illegible] CD 2/15—ENR 2/17.

Ont., Hamilton—TUNNEL—1,000 ft. tunnel Barton St. from Strathearne St. to Ave., to A. Cope & Sons, Ltd., 19 Alb **$36,995.**

LATIN AMERICA

Brazil and Uruguay — Governments Brazil and Uruguay plan international vehicle bridge across Artigue River Quarahy, Brazil, connecting with Artigas, Uruguay. Over **$150,000.**

Mexico, Campeche — State of Campeche Governor Lavalle Urbina, Campeche, water projects. **$100,000.**

Mexico, Campeche — State of Campeche Governor Lavalle Urbina, Campeche, construct and repair roads, highways, completion Hopelchen-Bolonchen street, own forces. **$100,000.**

Mexico, Chihuahua—State of Chihuahua Governor Chavez, Chihuahua, will take within 90 days, refrigerator plant. [illegible] Commission headed by Lic. Guillermo Caras, to complete plans.

Mexico, Chihuahua—State of Chihuahua Dr. Gustavo Baz, federal secy. of H Chihuahua, will take bids in July for hospital. **$250,000.**

Mexico, Cuatro Cienegas—Federal Government, Alberto Selinas Carranza, chief Federal Aeronautical Bd., Government Palace, Mexico City, will take bids within days, airport. **$150,000.**

Mexico, Culiacan—State of Sinaloa, Teodoro Cruz, gov., Culiacan, plans construct irrigation projects in state, during last half of 1944. **$250,000.**

Mexico, Guadalajara — Federal Government, Government Palace, Mexico City, in June, Air Corps Mechanics Technical School. **$300,000.**

Mexico, Leon—State of Guanajuato, Ernesto Hidalgo, gov., Leon, plans [illegible] schools in state, first to be at Ciudad Obregon. **$500,000.**

Mexico, Mazatlan — Mexican Government, Secrita. de Salubridad Publica y Asistencia, Mexico City, plans 250 bed civil [illegible] Hospital. **$210,000.** Cost covered by Federal and State Governments.

Mexico, Mazatlan—State of Sinaloa, Governor Teodoro C. Cruz, Culiacan, will construct houses, by own forces. **$350,000.**

Mexico, Mexico City — Mexican Government, Secrita. de Defensa Nacional, in City, plans military airport, having [illegible] 4 kilometers long, on government land kilometers from here. **$2,250,000.** Pres. Manuel Avila Camacho approved plans.

Mexico, Monterrey — City of Monterrey will take bids in June, construct school center to be called Leon [illegible] **$200,000.**

Mexico, Quatro Cienegas—General Rubber Co., Quatro Cienegas, plans rubber mfg. plant expansion. Over [illegible]

Mexico, San Luis Potosi—State of San Luis Potosi, Governor Benecio Lopez, San Luis Potosi, will construct and San Luis Potosi-Saltillo (Coahuila) stretch as far as state line. **$100,000.** construct new road between Salitrillo Coxcatlan, **$110,000,** by own forces.

Mexico, Saltillo—City of Saltillo, Bldg., preliminary plans hospital.

Mexico, Toluca—State of Mexico, Fabela, gov., Toluca, plans one-room throughout state, during last half of $350,000.

TIN AMERICA (Cont'd.)

...ico, Torreon—City of Torreon, will ... bids late in summer, for school center ... playgrounds, gymnasium, etc. $165,000.

...ico, Torreon—State of Coahuila, Ale... Lopez Garcia, school dir., Torreon. ... schools. $750,000. Work to be com... by 1946.

...ico, Vera Cruz—Federal Government, ...ne Ministry, Mexico City, will construct ... imprvs., roadways, piers, bldgs., etc., ...rt, by own forces. $2,000,000.

...ico, Villa Hermosa—State of Tabasco, ... Hermosa, will construct waterworks, ...ets and roads in entire state, by own ...ces. $113,000.

...ico, Xinonco—State of Vera Cruz, Dr. ...el Coosio Villegas, dir., Vera Cruz, ... 4 story hospital for tubercular patients ...lapa Dist. of Vera Cruz. $1,000,000.

...ezuela, Caracas—Venezuelan Petroleum ... Caracas, plans 500,000 gal. steel storage ... $135,000; plans pump. units on 100 ... crude oil pipeline between Santa Barba ... to Puerto de la Cruz, $100,000.

...ezuela, Caracas — Creole Petroleum ..., Caracas, subsidiary Standard Oil Co. ... J., 26 Bway., New York, N. Y., plans ...loping test oil wells, storage facilities, ...,000.

PUBLIC BUILDINGS

...OSED WORK

...Calif., Berkeley—Home Owners' Loan ...p., 1440 Bway., Oakland, Zone 12, plans ... H. Meigs, 547 Simon St., Hayward, ...verting bldg. at 2216 Carleton St., pro... living units for in-migrant war work... Case No. W4B-1497. $5,000.

...Calif., Chula Vista—Otay School Dist. of ... Diego Co., school addn. at Otay, near ..., Calif. 4-600-F. $39,200. FWA.

...Calif., Fresno—Home Owners' Loan Corp., ... Bway., Oakland, Zone 12, plans by H. ...al Lake, Route 3, Box 199, converting ...dence at 2107 Inyo St., providing 10 living ...s for in-migrant war workers, Case No. ...-6, $20,000

...Calif., Hawthorne—Hawthorne Elemen... School Dist. of Los Angeles Co., con...cting child care unit. Calif 4-603-F. ...,700. FWA.

...Calif., Hollister—Pub. Housing Auth., ...A. 785 Market St., San Francisco, 10 ...ller units, Calif. 4856 and 50 family trail... Calif. 4855.

...Calif., Long Beach—Bd. Educ., City Hall, ...s by H. Davies, Security Bldg., Garfield ...ool Annex, Reeve St. and Seabright Ave., ...f. 4-604-F, $170,000. FWA. CD 4/19—...R 4/27.

...Calif., Montebello—Montebello Unified ...ool Dist., Los Angeles Co., 2 child care ..., Calif. 4-598-F. $32,800. FWA.

...Calif., Oakland — Home Owners' Loan ...p., 1440 Bway., Zone 12, plans by A Farr, ... San Carlos Ave., Piedmont, converting ...g. at 1530 1 Ave., providing living units ... in-migrant war workers, Case No. W4B-...7. $6,000.

...Calif., Oakland—Home Owners' Loan ...p., 1440 Bway., Zone 12, plans by H. A. ...omsen, Jr., 315 Montgomery St., San ...ancisco, converting residence at 571 Fair... Ave., providing living units for in...grant war workers, Case No. W4B-1545. ...000.

...Calif., Oakland—Home Owners' Loan ...p., 1440 Bway., Zone 12, plans by M. J. ...rquis, 675 27 St., converting bldg. at Mar... St., 39 ft. south of 26 St., providing 4 ...ng units for in migrant war workers, ...e No. W4B-1425. $8,000.

...Calif., San Diego—Federal Works Agency, ...4 Santee St., Los Angeles, plans by F. ...pe, Jr., San Diego Trust & Savings Bldg., ...eration bldg., Calif. 4-574-N. $172,400. ... 4/10—ENR 4/13.

...Calif., Victorville—Pub. Housing Auth., ...A. 785 Market St., San Francisco, plans ... Marsh, Smith & Powell, 516 Architects ...g., Los Angeles, 50 family trailer units, ...if. 4864. CD 4/12—ENR 4/20.

...Conn., Groton — Federal Works Agency, ... Chauncy St., Boston, Mass., plans by ...olfield & Lindsay, 309 State St., New ...don, temporary cinder block 4 room ...ool, Fort Hill War Housing development. ... 4/12—ENR 4/20.

...Conn., New London—The Lawrence and ...morial Associated Hospital, Ocean Ave., ...ves training facilities, Conn. 6-217-N. ...,100. FWA. CD 2/29—ENR 3/2.

...Conn., Stratford—Town, 2 story addn. to ...rdseye School, Conn. 6-227-N. $58,100. ...WA.

...Conn., Stratford—Town, W. H. Shea, mgr., ...wn Hall, plans by F. H. Beckwith, 116 ...ll St., Bridgeport, bids soon 2 story, ...nt., brick Whitney School addn., Conn. ...22. $50,000. FWA. CD 10/29—ENR ...4.

...D. C., Anacostia—Yards & Docks, Navy ..., 14 St. and Constitution Ave. N.W., ...ash., 25, D.C., dispensary addn., N.R.S., ...T 9312.

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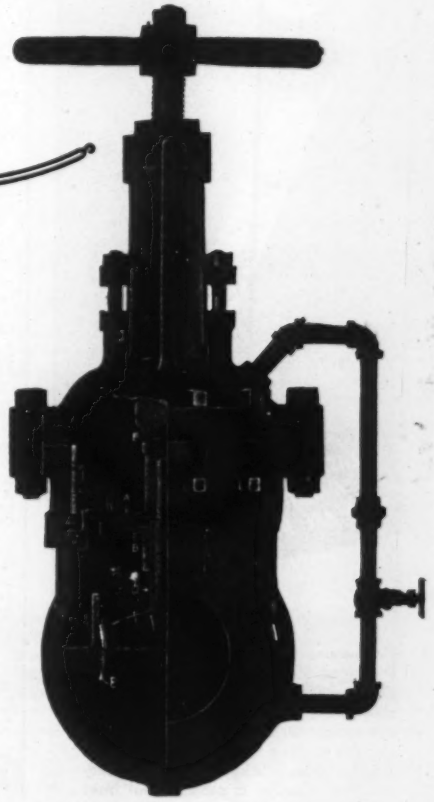

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

†Fla., Avon Park—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., bids soon 100 family dwelling units, Fla. 8245. F. A. Adams, Morgan St., Tampa, archt.

†Fla., Banana River—Pub. Housing Auth., NHA, Georgia Savings Bank Bldg., Peachtree and Broad Sts., Atlanta, Ga., 56 family unit housing at Naval Air Base for civil employees.

†Fla., Key West—Pub. Housing Auth., NHA, Georgia Savings Bank, Peachtree and Broad Sts., Atlanta, Ga., bids soon 140 dwelling units, Fla. 8246. Steward & Skinner, 736 Ingraham Bldg., Miami, archts.

†Ga., Macon—City, 2 addnl. stories to wing of Macon City Hospital providing living quarters for 48 student nurses, Ga. 9-289-N. $60,505. **FWA.**

†Ga., Milledgeville—The Bd. Regents of University System of Georgia, acting for the Georgia State College for Women, gymnasium addn. incl. necessary alterations, renovations for WAVES and SPARS, stationed at Georgia State College for Women Ga. 9-293-N, $21,100. **FWA.**

Ga., Milledgeville—State Bd. Educ., State Capitol Bldg., Atlanta, plans by R. Hitchcock & R. H. Driftmier, Athens, brick, stone operational trade school, dormitory, administration bldg., class rooms, officers, shops, heating plant.

★**Ill., Chicago**—Bd. Educ., 228 N. La Salle St., plans by J. C. Christensen, Bd. Educ., 228 N. La Salle St., 3 story, brick, rein.-con. vocational training school. $1,500,000.

†Ill., Chicago — Provident Hospital & Training School, 426 E. 51 St., plans by E. Grunsfeld, 540 N. Michigan St., 3 story, brick, rein.-con. nurses training school. $140,000. **FWA.**

Ill., Urbana—University of Illinois, Urbana, sports bldg. on campus, incl. swimming pool and other adequate sports facilities. Over $150,000.

†Ind., South Bend—Pub. Housing Auth., NHA, 201 N. Wells St., Chicago, Ill., plans by E. Grunsfeld, Jr., 540 N. Michigan Ave., Chicago, Ill., 140 family dwelling units, Ind. 12-189. CD 3/27—ENR 3/30.

†Ia., Cedar Rapids—Sisters of Mercy, 835 6 Ave. S.E., bldg. providing quarters for 40 student war nurses and training facilities; installing addnl. heating equip. for Mercy Hospital, Iowa 13-146-N. $117,000. **FWA.**

†Me., Bath—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., plans by J. H. Ritchie, 20 Newbury St., Boston, Mass., bids soon addnl. grading and drainage work housing, Me. 17023. Whitman & Howard, Inc., 89 Broad St., Boston, Mass., engrs.

†Me., Waterville—Federal Works Agency 99 Chauncy St., Boston, Mass., plans by E. T. P. Graham, 171 Newbury St., Boston, Mass., brick nurses home, Me. 17-158. $29,900.

†Md., Bainbridge (sta. Port Deposit)—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D.C., addnl. storage facilities, Naval Training Station, NOY 8262. CD 2/3—ENR 2/10.

†Md., Bethesda (br. Wash. D. C.)—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D.C., installing boiler and boiler plant accessories, Naval Medical Center, NOY 8716.

†Md., Indian Head—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D.C., magazine bldg., NOY 8931, garages NOY 9349, radiograph bldg., NOY 9350, foregoing for investigation laboratory, housing for Waves, NOY 9192, and chemical laboratory, NOY 9363, all foregoing at Naval Powder Factory.

†Md., Solomons (br. Wash. D.C.)—Yards & Docks, Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., 25, D.C., addnl. personnel facilities, NOY 8970; firefighters school, NOY 9105, both at Naval Mine Warfare Test Station.

†Mass., Beverly—Beverly Hospital Corp., Beverly, plans by Coolidge, Shepley, Bulfinch & Abbott, 1 Court St., Boston, 1 story nurses home, Mass. 19-197-N. $21,900. **FWA** gr. CD 4/10—ENR 4/13.

†Mass., Boston—Beth Israel Hospital Assn., 330 Brookline Ave., 4 story nurses' home addn., Mass 19-193-N. $59,700. **FWA.**

†Mass., Chicopee—Pub. Housing Auth., NHA, 24 School St., Boston, Mass., plans ready soon grading work and constructing drainage, Hampden St., Housing Mass 8-1. Charles Maguire & Assoc., Inc., 1515 Turks Head Bldg., Providence, R. I., engrs.

†Mich., Detroit—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., 780 unit temporary family dwellings, Mich. 20231.

†Mich, Fort Custer (br. Battle Creek)—Veterans Admin., Construction Service, Vermont Ave. between H and I Sts. N.W., Wash., 25, D.C., plans prepared, brick, steel, concrete ward bldgs., Veterans Hospital. $200,000.

†Minn., Duluth—St. Luke's Hospital Assn. of Duluth, 915 E. 1 St., bldg. addn., and minor alterations providing quarters for 36 student war nurses and supervisory per-

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LIC BLDGS. Proposed Work, Cont'd.)

addal. training facilities and enlarg- ining facilities at St. Luke's Hospital, 2-150-N. $125,000. FWA. CD 2/29 3/2.

, Minneapolis—Hennepin Co. Wel- Bd. Com. for Home School for Boys, lexander, chn., 110 Court St., plans by t & MacGregor, Minnesota State Fair ds, Como Ave., St. Paul, administra- ldg., and altering existing bldgs. $150,- CD 1/3—ENR 2/10.

, Brentwood—City Bd. Educ., Dr. J. R. ris, pres., and H. R. F. Jordon, secy., High School Dr., Brentwood, St. Louis lans by Wm. B. Ittner, Inc., 408 Bd. Bldg., 911 Locust St., St. Louis, Zone ick wing addn. to high school, Mo. 4-N. $117,000. FWA.

, Jennings—West Walnut Manor Bd. W. E. Kline, pres., 7053 Emma Av., Walnut Manor, St. Louis Co., St. Louis, 38, plans by W. B. Ittner, Inc., 408 Bd. Bldg., 911 Locust St., St. Louis, Zone ick school bldg., Mo. 23-291-N. $100,000.

, Lincoln—Bryan Memorial Hospital e Methodist Church, 4343 Summer St., ory bldg. addn., alterations providing ters for 18 student war nurses, Neb. 3-N. $16,500. FWA.

, Omaha—St. Catherine's Hospital, Forest St., bldg. providing quarters for udent war nurses and supervisory per- el, and necessary training facilities, also ying central heating plant, Neb. 25- N. $145,000. FWA.

Y., Sidney—Bd. Educ., Central School 1, Sidney, plans by M. Jordan, Ridge- Springs, 3 story elementary and high ol addn., N. Y. 30-275-N. $49,700. FWA. 4/19—ENR 4/27.

Y., Willowbrook (Staten Island)—U. S. 120 Wall St., New York, Zone 5, ing plans theatre. $37,500.

, Elyria—Comrs. Lorain Co. C. Comings, Court House, bond election in November, steel, concrete detention home. Silas Smith, Elyria Savings & Trust Bldg., ia.

kla., Norman—City, purchasing existing ital, and altering and constructing addn., 14-201-N. $156,000. FWA. CD 3/23 NR 3/30.

kla., Oklahoma City—St. University ital, 800 E. 13 St., plans by Noftsger, rence, Winkler & Reed and L. H. Bailey, N.W. 23 St., hospital bldgs., Okla. 93. $150,000. FWA.

re., Fairview—School Dist. 16, Mult- ah Co., school addn., sewage disposal ilities, etc., Ore. 35-173-N. $64,226. FWA.

a., Pittsburgh — Montefiore Hospital of Western Pennsylvania, purchasing ence to provide student nurses quarters Montefiore Hospital, 3459 5 Ave., Pa. 36-F. $31,648. FWA.

n., Chattanooga—Tennessee Tubercu- Control Comn., c/o Gov. P. Cooper, e Capitol, Nashville, surgical unit. ,000.

Tenn., Knoxville—Tennessee State Tu- berculosis Control Comn., c/o Gov. P. per, State Capitol, Nashville, tuberculosis ital. $500,000.

Tex., Camp Hood—U. S. Eng., Fort Sam ston, reconstructing recreation bldg. 900.

Tex., Houston—Veterans Admin., Ver- mont Ave., between H and I Sts. N.W., sh. 25, D.C., hospital, incl. 1 to 3 story, ow tile, concrete stucco, brick bldgs., all ilities, etc. $4,500,000. CD 1/19—ENR 1/27.

ex., Fort Lavaca—City, doubling size nicipal market. $225,000.

Tex., San Antonio—U. S. Eng., Fort Sam ston, unserviceable material repair shop, or pool park and service area. Over 000.

a., Charlottesville — University of Vir- ia, Charlottesville, plans by Taylor & ker, 1012 N. Calvert St., Baltimore, Md., es home addn. $225,000. Applied to A. CD 2/24—ENR 3/2.

Va., Dahlgren—Yards & Docks, Navy 18 St. and Constitution Ave. N.W., sh., 25, D.C., acid plant exten. Naval der Factory, NOY 8271.

Va., Dahlgren—Yards & Docks, Navy 18 St. and Constitution Ave. N.W., sh., 25, D. C., waves barracks, Naval Prov- Ground, NOY 9243.

Wash., Renton—Pub. Housing Auth., A. Skinner Bldg., 5 Ave. and Union St., ttle, Zone 1, plans by G. W. Stoddard, heum Bldg., Seattle, Zone 1, 432 unit mitory housing, Wash. 45233. $250,000. 4/27—ENR 5/4.

+Wash., Vancouver—School Bd., plans by D. J. Stewart, Central Bldg., school addns to 5 schools, Wash. 45-390-C. 5,105. FWA. CD 4/28—ENR 2/27.

W. Va., Fairmont—City, nurses home ad- and remodeling bsmnt. providing train- facilities space for Fairmont General pital, W. Va. 46-142-N. $58,000. FWA.

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

★**Wis., Waupaca** — Wisconsin Adjutant General Dpt., State Capitol Madison, plans nearing completion, by R. C. Kirckhoff, state archt., veterans hospital, at Grand Army Home. $700,000.

★**Alta, Edmonton**—Dept. P. Wks., Edmonton, tuberculosis hospital, on campus of University of Alberta. $600,000.

Que., Chicoutimi—Province of Quebec, Dpt. Attorney-General, Parliament Bldgs., Quebec City, courthouse. $150,000. Dpt. P. Wks., Custom House, Quebec City, engr.

Que., Gaspe—Province of Quebec, c/o Dpt. Attorney-General, Quebec City, courthouse and jail. $150,000. Dpt. P. Wks. Quebec City, engrs.

★**Que., Verdun (Montreal)**—Verdun Protestant Hospital Governors, 6875 La Salle Blvd., plans by J. C. McDougall, 1235 McGill College Ave., Montreal, 450 bed hospital addn. $1,000,000. McDougall & Friedman, 1235 McGill College Ave., Montreal, engrs. CD 3/1—ENR 3/9.

BIDS ASKED

Bids Asked In May

†**Conn., Stratford**—Wm. H. Shea, town mgr., Town Hall, 2 story, brick Birdseye School addn., Conn. 6-227. $33,000. FWA. F. H. Beckwith, 115 Wall St., Bridgeport, archt. CD 1/6—ENR 1/13.

Bids Asked May 9

†**N. J., Elizabeth**—City of Elizabeth Housing Auth., 688 Maple Ave., erecting ventilation and crawl spaces for Proj. N.J. 3-2, for NHA. Plans deposit $5. L. Polhman, 1140 E. Jersey St., archt. CD 3/13—ENR 3/16.

Bids Asked May 10

†**Mich., Detroit**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., 550 unit temporary family dwellings, Mich. 20229. Plans deposit $25. Smith, Hinchman & Grylls, Marquette Bldg., archts. CD 3/23—ENR 3/30.

†**Pa., Phila.**—Pub. Bldgs. Admin., 18 and F Sts. N.W., Wash., 25, D. C., addnl. lighting facilities at U.S. Mint, 16 and Spring Garden Sts., for Treas. Dpt., 15 St. and Penna. Ave. N.W., Wash., 25, D. C. FWA.

Ont., Camp Borden—Secretary Dpt. Munitions & Supply, Ottawa, 1 and 2 story O.M.E. workshop, incl. 82x250 ft., 82x381 ft., 82x215 ft., and 44x83 ft. steel, concrete, brick wings, for Dpt. Natl. Defense (Army), Ottawa. $250,000.

Bids Asked May 12

†**Calif., San Francisco**—Pub. Bldgs., Admin., 18 and F Sts. N.W., Wash., 25, D. C., 2 story, 27x210 ft., wood frame cadet nurses dormitory on University of California campus, Calif. 4573. T. L. Pflueger, 580 Market St., archt. CD 4/19—ENR 4/27.

Bids Asked May 13

†**Calif., Berkeley** — Home Owners' Loan Corp., 1440 Bway., Oakland, Zone 12, converting residence at 2930 Adeline St., providing 4 living units, Case No. W4B-1463, $8,000; at 2932 Adeline St., providing 6 living units, Case No. W4B-1312, $12,000; at 2934 Adeline St., providing 4 living units, Case No. W4B-1462, $8,000, all for in-migrant war workers. M. J. Marquis, 675 36 St., Oakland, archt. CD 4/12—ENR 4/29.

†**Va., Arlington**—School Bl., Arlington Co., Arlington, 20-room, brick school bldg., Shirley Hy. $240,000. FWA. W. L. Dixon, State Office Bldg., Richmond, archt. CD 3/20—ENR 3/23.

Bids Asked May 16

†**Conn., Hartford**—Hartford Housing Auth., 846 Asylum Ave., regrading, drainage, site imprvs., underground sewer work, lawns, planting, etc., Charter Oak Terrace Housing, Conn. 3-4, for NHA. Plans deposit $25. C. A. Currier, 967 Farmington Ave., West Hartford, engr.

★**Que., Longue Point (Montreal)**—Secretary Dpt. Munitions & Supply, Ottawa, Ont., addnl. Storage Bldgs. 9 and 11, each 600x3500 ft., rein.-con., for Dpt. Natl. Defense (Army), Ottawa, Ont. $900,000.

Bids Asked May 18

★**Que., Montreal**—R. T. Donald, Dpt. Munitions & Supply, Ottawa, Ont., 600x3,500 ft., rein.-con. storage bldg. addns., for Dominion Govt., Ottawa, Ont. $500,000. Dpt. Natl. Defense, Ottawa, Ont., archts.

Bids Asked May 20

†**Mich., Royal Oak**—Pub. Housing Auth., NHA, 2073 E. 9 St., Cleveland, O., 220 unit temporary family dwellings, Mich. 20226. Plans deposit $25. O. Winn, Highland Park, archt. CD 4/25—ENR 4/27.

Bids Asked About June 1

†**N. J., Somerville**—Somerset Hospital, Rehill Ave., 3rd story brick hospital addn., alterations, N.J. 28-177-N. $300,000. FWA. Crow, Lewis & Wick, 200 Fifth Ave., New York, N. Y., archts. CD 4/10—ENR 4/13.

Bids Asked June 20

†**Ala., Tuskegee**—Veterans Admin., Vermont Ave. between H and I Sts. N.W., Wash., 25, D. C., addnl. bldgs., utilities, incl. N.P. Infirmary Bldg. 68; Accute Bldg. 69; 2 connecting corridors, roads, walks, drainage, grading, etc. CD 1/28—ENR 2/3.

Bids Asked

†**Mass., Boston**—U. S. Eng., 21 St. Jam Ave., Boston (selected bidders), exter bldg. alterations, No. 19-022-44-Neg-134.

†**Tex., Daingerfield**—Lone Star Steel Southland Life Bldg., Dallas, and Dain field, addnl. steel plant facilities. $40 Defense Plant Corp. will finance. CD ENR 4/6.

LOW BIDDERS

†**Calif., Los Angeles**—Housing Auth. City of Los Angeles, 1401 E. 1 St., Apr. site imprvs., for 360 portable dwelling u Calif. 4832, 4839 and 4841, for NHA, f E. C. Nesser, 4822, W. Jefferson Bl $180,700. Bids 4/6 rescinded. A. Mon 3021 Waverly Dr., archts. CD 4/14—2 4/20, under LB.

†**Calif., Mare Island**—Yards & Do Navy Dpt., 18 St. and Constitution A N.W., Wash., 25, D. C., Apr. 25, lau and shop bldg., Spec. 13261, from Bat & Hilp, 918 Harrison St., San Franc $155,725.

†**Calif., San Diego**—Pub. Housing Au NHA, 785 Market St., San Francisco, 25, vitr. clay sanitary sewer connectio 500 trailer sites, Calif. 4680, from P. Artukovich, 3334½ W. Slauson Ave., Angeles, $25,914.

†**La., New Orleans**—Pub. Housing Au NHA, 1205 Electric Bldg., 7 and Ta Sts., Fort Worth, Tex., drainage w sewers for housing, La. 16100 and 16 from G. Favrot, Balter Bldg., $12 CD 3/7—ENR 3/9.

†**Md., Patuxent River**—(br. Wash., C.)—Yards & Docks, Navy Dpt., 18 and Constitution Ave. N.W., Wash., D. C., Apr. 21, supply depot office warehouse, Naval Air Station, NOY 1 from Consolidated Engineering Co., 2 Franklin St., Baltimore, $216,800. CD 4/1

†**Mass., Northampton**—Veterans Adm Vermont Ave., between H and I Sts. N. Wash., 25, D. C., Apr. 25, brick, stone, addn. to Bldg. 1, incl. walks, grad roads, excavating, drainage, outside s ice and electric work, Neuro-psychiatric stitute, from Skolnick Bldg. Corp., 1 42 St., New York, N. Y., $416,750. 3/16—ENR 3/23.

†**Tex., Orange**—Pub. Housing Auth., NH 1205 Electric Bldg., Fort Worth, Apr. landscaping school grounds. Tex. 41 from Vivrett & Vivrett, 905 Southland L Bldg., Dallas, $39,800. Carter & Bur Century Bldg., Fort Worth, engrs. archts.

CONTRACTS AWARDED

†**Calif., Hunters Point**—Yards & Doc Navy Dpt., 18 St. and Constitution A N.W., Wash., 25, D. C., addnl. hous and recreational facilities, NOY 8215, G. W. Williams Co., 10 California B Burlingame, $382,900. CD 1/21.

†**Calif., Richmond**—Pub. Housing Au NHA, 785 Market St., San Francisco, supplemental site imprvs., involving repair demolition and removal broken paveme excav. uunstable sub-grade, replacing wood fuel oil tanks by rein.-con. and s tanks in connection with housing, Ca 4411, Richmond Trailer Park; Calif. 4 Esmeralda Proj.; Calif. 4173, Richm Dormitories; Calif. 4715, Harbor Gate Pr Calif. 4176, Canal War Apts.; Calif. Canal War Dormitories; Calif. 4178, Ri mond War Terrace Apts., to Clemens Co., Box 277, 491 Atherton St., Hayw $79,982.

★†**Calif., Seal Beach**—Yards & Doc Navy Dpt., 18 St. and Constitu Ave. N.W., Wash., 25, D. C., magaz facilities, Naval Magazine & N. N. NOY 8959, to W. E. Kier Constr. & & William Simpson Constr. Co., Arch Bldg., Los Angeles, Zone 13, $2,1 077. CD 4/19 under LB.

★†**Calif., Shoemaker** — Yards & Doc Navy Dpt., 18 St. and Constitu Ave. N.W., Wash., 25, D. C., 2nd increm of increased facilities, bldgs., NOY 9 to MacDonald & Kahn, 200 Financial C ter Bldg., San Francisco, $2,631,000

†**Conn., Groton**—Pub. Housing Auth. NH 24 School St., Boston, Mass., trailer fac ties, incl. fdns., water and sewer utili overhead electric distr., imprv. grad site, Conn. 6214, to Bedford Hills Con Co., 90 Hartland St., East Hartford, $65,8 Payne & Keefe, 231 State St., New Lond archts.

†**Idaho, Arco**—Yards & Docks, N Dpt., 18 St. and Constitution Ave. N. Wash., 25, D. C., maintenance shop equipment storage, paving, Naval Pro ing Ground, NOY 8125, to Northeast Constr. Co., Salt Lake City, Utah, $118,8 CD 1/31.

†**Ill., Chicago**—Yards & Docks, N Dpt., 18 St. and Constitution Ave. N. Wash., 25, D. C., addnl. facilities, NO 9427, Naval Training School, to Cam Constr. Co., 333 N. Michigan Ave., $1 367. CD 4/14—ENR 4/27.

†**Ind., Crane**—Yards & Docks, Navy Dp 18 St. and Constitution Ave. N.W., Wash 25, D. C., addnl. facilities, Naval Amm nition Depot, NOY 8372, to Pearson Cons Co., 917 Kentucky Home Life Bldg., Lou ville, Ky., $129,444. CD 2/21.

LIC BLDGS. (Contracts Awarded, d.)

Muncie—U. S. Eng., 612 Federal Louisville, Ky., addn. Borg-Warner plant, Contr. 15-029-eng-490, to Hag- Constr. Co., 402 E. Superior St., Wayne, est. $203,314.

Edgewood—U. S. Eng., Standard Baltimore, prototype target bldg., Bros., 1511 N. Cameron St., Har- Pa., $165,000. Bids 4/22.

Muskegon—Pub. Housing Auth., 2972 E. 9 St., Cleveland, O., 100 unit housing, Mich. 20036, to Cun- am-Rudy Co., 308 W. Grand Blvd., $330,000. Bids 2/14. CD 2/11— 1/20.

Hastings—Yards & Docks, Navy 18 St. and Constitution Ave. N.W., 25, D. C., reconstructing bldg. fa- Naval Ammunition Depot, NOY to Mazon Constr. Co., 131 N. Ludlow Dayton, O.

Hawthorne—Yards & Docks, Navy 18 St. and Constitution Ave. N.W., 25, D. C., ammunition overhaul fa- Naval Ammunition Depot, NOY to Cal-Vada Constr. Co., 15 W. 2 St., $343,313.

Y., Scotia—Yards & Docks, Navy Dpt., and Constitution Ave. N.W., Wash., C., sprinkler sys. for material store- Naval Supply Depot, NOY 9022, Rockwood Sprinkler Co., 38 Harlow Worcester, Mass., $98,234. Bids 4/8. 3/14.

Harrisburg—U. S. Eng., Standard Bldg., Baltimore, Md., alterations and Harrisburg Shops at Farm Show Contr. 18-020-eng-357, to H. B. ander & Son, 3 and Vaughn Sts., 33.

Rochester—Rochester General Hos- A. Mayer, pres. Exec. Bd., Pinney rehabilitating interior 6 story, brick tal, to Cook Anderson Co., 5 and ance Sts., Beaver. Est. $150,000. CD -ENR 1/20.

Va., Roanoke—Veterans Admin., Ver- ont Ave. between H and I Sts. N.W., 25, D. C., addnl. bldgs., utilities, ans Hospital, to Caristo Const. Corp., Court St., Brooklyn, N. Y., $1,557,500. 4/11, awarded 4/24. CD 4/12—ENR under LB.

Wash., Kennewick—Pub. Housing Auth., Skinner Bldg., Seattle, Zone 1, pre- g sites for 300 trailer housing, Wash. to Strand & Sons, 3939 University Seattle, Zone 5, $129,000. J. W. Malon- Larson Bldg., Yakima archt.

W. Va., White Sulphur Springs—U. S. Chesapeake & Ohio Bldg., Hunting- bldg., steam plant, appurtenances, ard General Hospital, Contr. 46-022- 33, to A. G. Higginbotham Co., 407 ston Natl. Bank Bldg., Charleston, 00.

OMMERCIAL BUILDINGS

POSED WORK

s., Minneapolis — Glenwood Hills Hos- R. Rascop, supt., 3501 Golden Valley plans by Larson & McLaren, 1901 ay Tower, hospital addn. and nurses ters. $250,000. CD 4/5—ENR 4/13.

., St. Louis—Third Baptist Church, d and Washington Blvds., Zone 3, deling, repairing church interior, pro- g addnl. Sunday school classrooms, etc. 000.

, Cleveland—The 2925 Euclid Co., c/o Bernstein, Hippodrome Bldg., plans George Howard Burrows, 3113 N. More- Blvd., apartment hotel, 30 St. and d Ave. Over $150,000.

, Shaker Heights—S.K.T. Co., c/o H. Shepherd, 3654 Daleford Rd., Cleveland, by M. A. Norcross, 7017 Euclid Ave., eland group brick wall, steel frame tment bldgs., totaling 67 suites. $400,-

., La Marque—La Marque Development Dickinson, indefinitely postponed taking 75 masonry type dwellings. $360,000. & McClendon, 2801 San Jacinto St., ton, engrs. CD 2/16—ENR 2/24.

TRACTS AWARDED

lif., San Francisco — H. Doelger, 320 h St., forty-eight 2 story frame bldgs., on St. and 19 Ave., Taraval St. and 34 and 43 Aves., Balboa St. and nd 39 Aves., Irving St. and 34 Ave., Kirkham St. and 20 Ave. Owner builds. 000.

., Houston—Hub Development Co., Box 44 frame dwellings, force account. 000.

., San Antonio—Meadowview Develop- Corp. Rte. 3, Box 405 C, one hundred nd 4 room dwellings, force account. 000. CD 4/19—ENR 4/27.

NDUSTRIAL BUILDINGS

POSED WORK

alif., Fontana—PLANT—Henry J. Kaiser ., Fontana, shell forging and machining $5,000,000.

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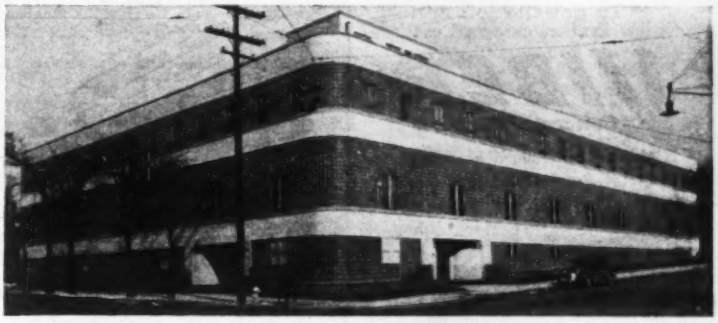

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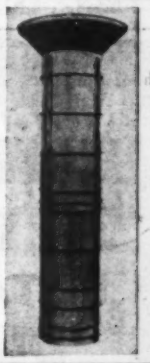

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INDUSTRIAL BLDGS. (Proposed Work, Cont'd.)

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N. Y., Tonawanda — ENGINE PLANT — Albert Kahn Associated Architects & Engineers, Inc., archts. and engrs., 345 New Center Bldg., Detroit 2, Mich., soon lets contract, brick, steel, concrete engine plant addns. for Chevrolet Motor Car Div. General Motors Corp., General Motors Bldg., Detroit, Mich. Approx. $100,000.

N. C., Concord—PLANT—Bob's Laundry Co., R. E. Ridenhour, Jr., mgr., Concord, rebuilding plant and office bldg. $100,000 incl. equip.

O., Ashland — FACTORY — Althouse & Jones,, Archts., 28 Park Ave., Mansfield, soon let contract 1 story, 80x145 ft., brick, steel, factory addn., for Eagle Rubber Co., R. Long, pres., Orange St. $50,000. CD 11/16—ENR 11/18.

Okla., Oklahoma City — WAREHOUSE — O. K. Transfer & Storage Co., 531 W. Main St., warehouse. Over $40,000.

Ore., Madras — POWER PLANT — Pacific Power & Light Co., Public Service Bldg., Portland, constructing Cove power plant, on Crooked River, near here. $300,000.

Tex., Dallas — WAREHOUSE — Joe H. Smith, 800 W. Jefferson, concrete, hollow tile warehouse. $40,000.

Tex., Houston — WAREHOUSE — Damon Wells, 2107 McKinley St., three 1 story, 64x250 ft. warehouses, $100,000 or more.

Tex., Port Isabel — PLANT — Technical Fisheries Co., 1332 Evans Ave., San Francisco, Calif., and c/o J. L. Kline, Port Isabel, plant for extraction and manufacturing (for market) shark oil. Over $40,000.

★ **B. C., Zeballos Valley**—FURNACE, etc. —Privateer Mines Ltd., c/o J. S. Tait, 940 Richards St., Vancouver, 50 ton charcoal blast furnace, and steel plant. $325,000; construction planned later on includes developing hydro-electric energy for operation steel plant, $250,000, and installing 25 ton electric furnace, $225,000.

Que., Montreal—PLANT—Duke Brennan Waste Rag Co. Reg., 17 Nazereth St., remodeling plant.

BIDS ASKED

Bids Asked May 8

Que., Montreal—RAILWAY BLDG.—W. P. Harper, div. engr. Canadian Pacific Ry., Park Ave. Sta., sleeping, dining, parlor car services bldg., Glen Yards, near Decarie Blvd. $250,000.

Bids Asked

Ont., Oshawa—PLANT—E. I. Richmond, 455 Spadina Ave., Toronto, plant for Peter Bakogeorge, 25 King St. E., $56,000. CD 3/8—ENR 3/9.

CONTRACTS AWARDED

Conn., East Hartford—PLANT—Pratt & Whitney Div., United Aircraft Corp., 400 Main St., eight 1 story, bsmnt. aircraft engine test cells plant, to Turner Constr. Co., 38 Newbury St., Boston, Mass. Est. over $40,000. Bids 4/20. CD 4/10—ENR 4/13.

Ill., Chicago—FACTORY—Industrial Condenser Corp., 1725 W. North Ave., general contract 1 story, 136x210 ft. factory, to Dahl-Stedman Co., 11 S. La Salle St. Holabird & Root, 333 N. Michigan Ave., archts.

★ **Ill., Springfield** — FACTORY — Allis-Chalmers Mfg. Co., 1126 S. 70 St., West Allis, Wis., 1 story, 400x750 ft. factory and 3 story, 75x300 ft. office bldg., brick, reinf.-con., to Permanent Constr. Co., 208 S. La Salle St., Chicago, $2,500,000. Bids 4/20. CD 4/19—ENR 4/27.

Mass., Everett (br. Boston)—PLANT—General Electric Co., 920 Western Ave., Lynn, 1 story, brick plant alterations, addn., to Turner Constr. Co., 38 Newbury St., Boston. Est. $45,000.

Mass., South Boston—FACTORY—Macallen Co., 16 Macalin St., 3 story, brick, concrete factory, Dorchester Ave., to McCutcheon Co., 250 Stuart St., Boston. Est. $60,000. Bids 4/14. CD 4/11—ENR 4/13.

Minn., Minneapolis—WAREHOUSE—Deere & Webber Co., 800 Washington Ave. N., general contract, warehouse alterations, to C. O. Field Co., 2940 Harriet Ave., $40,000.

Mo., St. Louis—FACTORY—Mines Equipment Co., 4215 Clayton Ave., Zone 10, 1 story, 102x300 ft., brick factory, concrete fdn., 4255 Clayton Ave., to Woermann Constr. Co., 3800 West Pine Blvd., Zone 8. Est. $100,000.

Mo., St. Louis—FACTORY—Purex Corp., 4610 Chippewa St., Zone 16, repairing 180x288 ft. lanudry supplies (chemical) factory, to Geo. Cousins Constr. Co., Skinner and Delmar Blvd., Zone 12. Est. $70,000. V. G. Mueller, 915 Newport Ave., Webster Groves, St. Louis, 19, archt.

Mo., St. Louis—FACTORY—Service Products Co., 4438 North 20 St., Zone 7, 1 story, 106x120 ft., brick factory, concrete fdn., to H. Brock, 3300 York Court, Zone 8. Est. incl. equip. $40,000. Koerner Eng. Co., Syndicate Trust Bldg., 915 Olive St., Zone 1, engrs.

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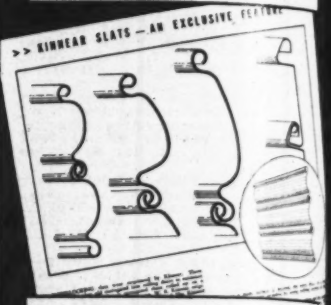

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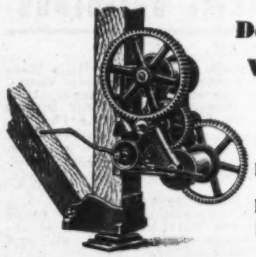

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STRIAL BLDGS. (Contracts Awarded, nt'd.)

St. Louis—WAREHOUSE—Manufac- Railway Co., 2927 South Bway., Zone and 1 story, 33x191 ft., brick ware- concrete fdn., to W. C. Harting Co., 722 Chestnut St., Zone 1. Est. equip. $40,000. F. R. Nauman, 4710 ington Ave., Zone 8, archt.

Billings—RAILROAD STATION, Northern Pacific Ry. Co., R. Blum, ngr., 176 E. 5 St., St. Paul, railroad ager station imprvs., incl. replacing platforms with new rein.-con., rear- ar station tracks, addns. and relocat- ater piping and hydrants, steam piping, outlets, installing floodlights, etc., forces. $200,000.

Y., Huntington — FOOD LOCKER NT—Country Life Frozen Foods, Inc., Lexington Ave., New York, design and ruction frozen food locker plant, to on G. Bush Lumber Co., 370 Lexington New York. Est. $75,000.

J., Newark—FOUNDRY—M. H. Det- e Co., 111 Gotthardt St., foundry addn., cker Constr. Co., 361 Grove St., $42,000. ner, c/o contractor, engr.

Y., Westbury—FOOD LOCKER PLANT unty Life Frozen Foods, Inc., 370 Lex- on Ave., New York, design and con- ction, frozen food locker plant, to Clin- G. Bush Lumber Co., 370 Lexington New York. Est. $100,000.

Cleveland—FACTORY—Diesel Engine of General Motors Corp., 2160 W. 106 story, 117x156 ft., brick, steel, con- factory addn., to Austin Co., 16112 d Ave. Est. $250,000. CD 4/3—ENR

Cleveland—FOUNDRY—Ferro Machine oundry Co., J. M. Price, pres., 3155 E. 1 story, 64x20 ft., brick, steel, foundry to Albert M. Higley Co., 2036 E. 22 Est. $75,000. CD 4/18—ENR 4/20.

Willoughby—FACTORY—Ohio Rubber R. Keach, purch. agt., Ben Hur Ave., ry, 90x300 ft., steel, concrete block tank iming track factory addn., to G. C. nd, 16 Brown Ave. Est. $75,000.

Ellwood City—FOUNDRY—Hi-Alloy g Co., Herbert Davis, purch. agt. and Block House Run Rd., New Brighton. ory, 90x105 ft., concrete block, corru- d iron foundry bldg., 22x35 ft. wing, and 13x17 ft. lean-to's, to Henretty r. Co., 906 Century Bldg., Pittsburgh. 0,000. CD 4/18—ENR 4/20.

Pittsburgh—MANUFACTURING—Pal- Mfg. Co., J. Lewis Palley, pres. and 1017 Bidwell St. NS., Pittsburgh 1 L-shaped, 120x125 ft. bldg. addn., to l Constr. Co., 3828 Forbes St. Est. 00. Marks & Simboli, 702 Grogan Bldg., ts.

a., Springdale—POWER PLANT—West Penn Power Co., A. N. Cartwright, vice West Penn Bldg, 14 Wood St., Pitts- h, design and construction power plant to Sanderson & Porter, 52 William New York, N. Y. Est. $6,000,000.

ex., Houston—PLANT—Hughes Tool Co., 00 Hughes St., two 2 story machine units, 20x400 and 20x503 ft.; 2 story house unit; small warehouse, and 3 ellaneous bldgs., all concrete, brick, hol- tile, steel, etc., to Southwestern Constr. Washington & M-K-T Tracks, $1,700,000. Cummins, Bankers Mtg. Bldg., engr.

x., Houston—SHOP—Wm. A. Smith 1911 W. Alabama St., 1 story, brick, w tile, etc., mechanical shop bldg., to Braunagle, 1129 E. 14 St., approx. 00.

a., Menasha—WAREHOUSE—C. Re- Transfer Line & Storage Co., Inc., 411 eld Ave., 1 story, 150x150 ft., steel, rete block warehouse, concrete fdn., to Bros. Constr. Co., 48 Otter St., kosh.

a., Milwaukee—FORGE SHOP—Ampco l Co., Inc., 1745 S. 38 St., 1 story, 0 ft. forge shop, to Peters Constr. Co., N. 33 St. CD 3/31—ENR 4/6.

a., Milwaukee—PLANT—Koehring Co., W. Concordia Ave., 1 story, 53x124 ft., brick shipping room addn., concrete to Lapinski, Inc., N. 1 St. and E. Capi- r. G. J. DeGelleke, 152 W. Wisconsin archt.

a., Neenah — EQUIPMENT BLDG. — nay-Plummer Co., Neenah, 1 story, 0 ft., concrete block, rein.-con. equip- bldg., concrete fdn., to Fluor Bros. r. Co., 48 Otter St., Oshkosh.

a., West Bend—SHOP, etc.—Gehl Bros. Co., 143 Water St., 2 story, 60x72 ft., con., brick shop and office bldg., to Bros. Co., Inc., 218 N. Main St. R. H. an, 8403 W. Thurston Ave., Milwaukee, t.

a., Eastview (Postal Dist. Ottawa)— T—Capital Carbon & Ribbon Co. Ltd., n St., plant reconstruction, to Wm. st, 212 Montreal Rd., $95,000. CD

Proposal Advertisements see p. 176
Postwar Projects see p. 151

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Bids: May 17, 1944 (238)

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Plans and specifications may be obtained from Harry R. Hall, Chief Engineer of the Commission, Hyattsville, Maryland, upon deposit of $5.00, which deposit will be returned to bidders, or to those returning plans and specifications in good condition.

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